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The fine art of Breguet: his hands and faces stood the test of time (p. 92)

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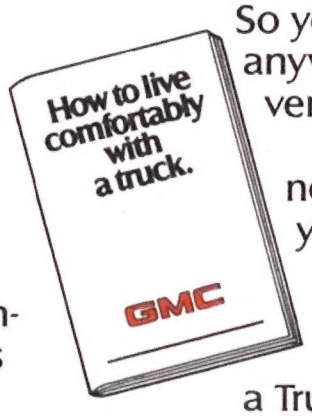

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May 1985

Smithsonian

Volume 16, Number 2

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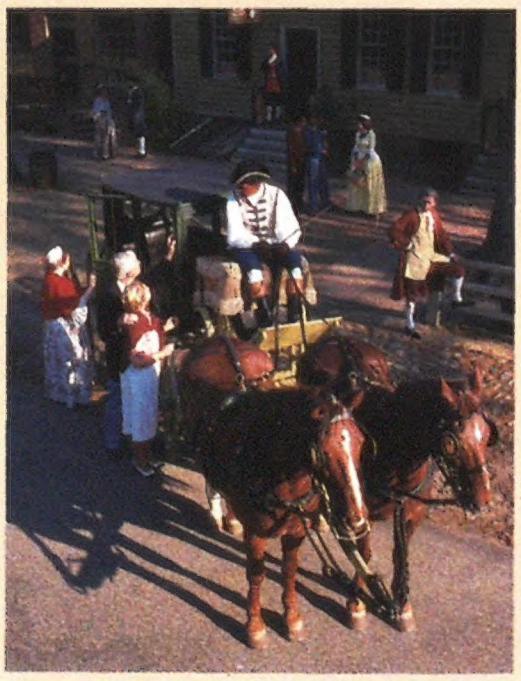

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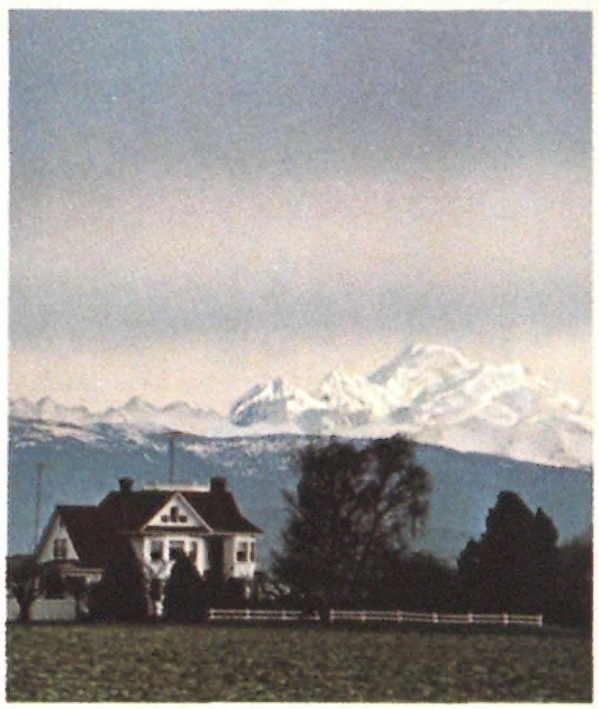

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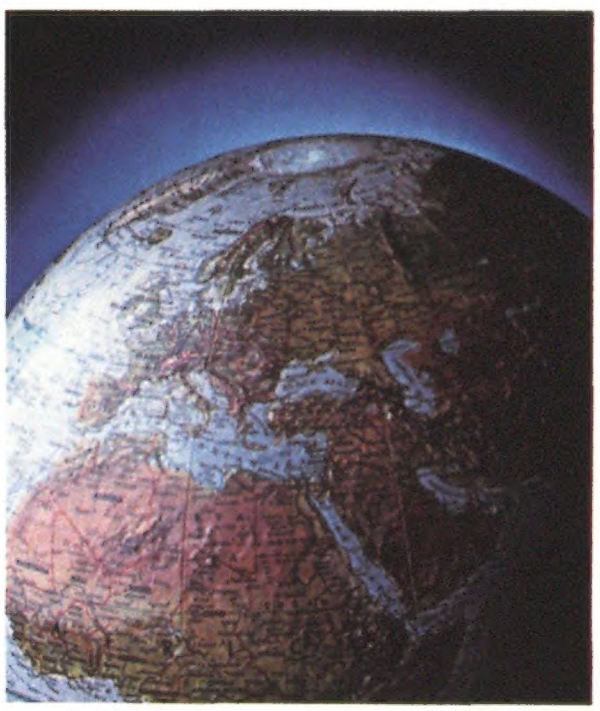

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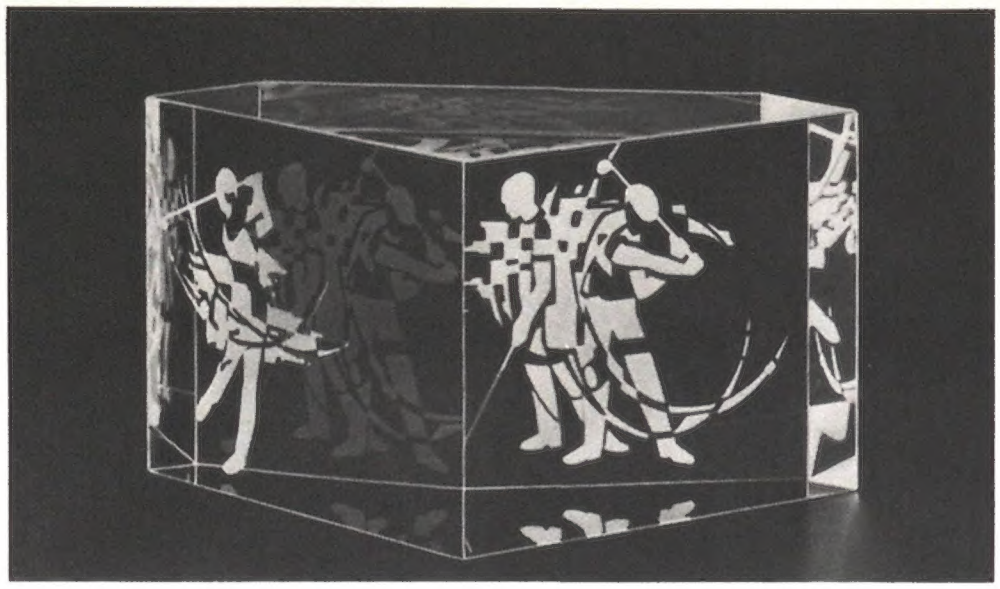

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Secretary Adams' comments

Smithsonian horizons

Advances in instrumentation and space observation open new windows on the Universe

New instruments play a role in scientific advance that may not be fully appreciated. Typically, they are often big-ticket items with obscure functions, sought because they may assist in refining a measurement or testing some theory even more abstruse than those currently prevailing. Hence it is no surprise that hard-pressed administrators, having few means of their own to reckon the cost of opportunities forgone, may occasionally see cuts in funding for new instrumentation as an acceptable way in which to meet looming budget deficits.

The fields of astronomy and astrophysics are good ones in which to see the pervasive importance of scientific instruments more clearly. Broadly speaking, the aims of the former are descriptive, while the latter is concerned with understanding the major physical processes involved in the evolution of the Universe itself. Thus the two flourish in intimate interaction with each other. Astrophysical theories feed on astronomical discoveries of new classes of phenomena, on newly observed puzzles or complexities needing to be explained, and on improvements in the precision of measurements. In turn, those theories direct astronomers' attention to critical priorities for observation—priorities of no little importance when you consider that the Universe within the range of existing instruments probably contains more than 100 billion galaxies.

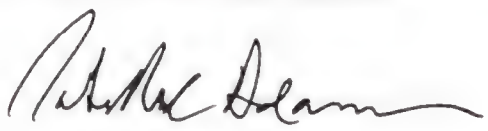
Important as the Hubble Space Telescope will be upon its hoped-for launching in mid-1986, there is no single, magic instrument that will meet more than a fraction of astronomy's observational needs. Earth-based observatories, in spite of the disadvantages imposed by our intervening atmosphere, will in many respects offer superior light-collecting power, flexibility and innovative potential for a long time to come.

But new and larger telescopes cannot be mere replications of one another. The demanding technology needed to create great single mirrors has encouraged astronomers to seek alternative approaches, such as the Multiple Mirror Telescope on Mt. Hopkins, which the Smithsonian runs jointly with the University of Arizona. In this innovative and highly successful instrument a number of smaller reflectors are used in concert so that their images are additive.

But this is only a beginning. Another major thrust of astronomy has been to extend the range of observation beyond the relatively narrow band of visible light. At longer wavelengths, this led first to radio and infrared astronomy. Now Smithsonian scientists are giving attention to instruments that will improve penetration into the submillimeter range by the 1990s.

At the opposite end of the spectrum lies x-ray astronomy, using satellites as viewing platforms because the radiation at these extremely short wavelengths is absorbed by the Earth's atmosphere. The Smithsonian played a major role in building the largest x-ray telescope yet placed in space, the Einstein Observatory, and is deeply involved in the planning for the one to follow. What is remarkable about each of these wavelength regions is the significantly different set of phenomena revealed. A much more complex picture thus emerges, not only of the nature of stars and galaxies but of supposedly "empty" interstellar space. All such new developments, most of them linked to advances in instrumentation and space observations, may be regarded as opening new windows on the Universe.

The Smithsonian Astrophysical Observatory is located in Cambridge, Massachusetts, where it is joined with the Harvard College Observatory to form the Center for Astrophysics. This has proved a powerful and attractive arrangement from virtually every point of view, one that commends itself to other fields of Smithsonian research activity, both in Washington and elsewhere in the country. Some 150 scientists are involved, one of the largest such groupings anywhere (and perhaps five percent of the total U.S. scientific community concerned with these fields). It is one of our oldest, largest and most important research undertakings. Budget pressures are likely to be very severe in the years ahead, but we shall do everything we can to support SAO's need for new instruments.



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Letters to the Editor

Salvage yards

Dear Sir: Your March cover story calls to mind some of my happiest hours in automotive junkyards. I've always considered many of them museums of art and transportation. One of my favorites was Bunch's in Escalon, California. It is no more, but my memories of its relics, rusting quietly among the flowering almonds, remain strong.

Mr. Bunch was a strange old duck. One day a man from the Bay Area came in looking for an ammeter for his Model A Ford. Mr. Bunch took the man into a special shed and found an ammeter in perfect condition. "Five dollars." "*Five dollars*—that gauge isn't worth it," said the gentleman. Whereupon Mr. Bunch dropped the ammeter on the dirt floor, stamped it with his heel and, smiling maliciously, said, "No, I guess you're right."

No one haggled price with Mr. Bunch.
Michael Lamm
Stockton, California

Dear Sir: If that $400 right-hand-drive Datsun 240Z ever gets stateside, let me know. I'll buy it. As proud owner of a 1973 former U.S. Postal Service jeep, I know right-hand drive is a piece of cake. The best part is the looks you get from passers-by when your springer spaniel is sitting in the left front seat.
David Pawlicki
Maumee, Ohio

Dear Sir: Automobile salvage has become a fine art. Commissioned by the Fondation Cartier at Jouy-en-Josas, France, artist Arman embedded in concrete 59 cars gleaned from different junkyards. With great impartiality, he included automobiles from the United States, France, England, Italy, Germany and Japan. A model

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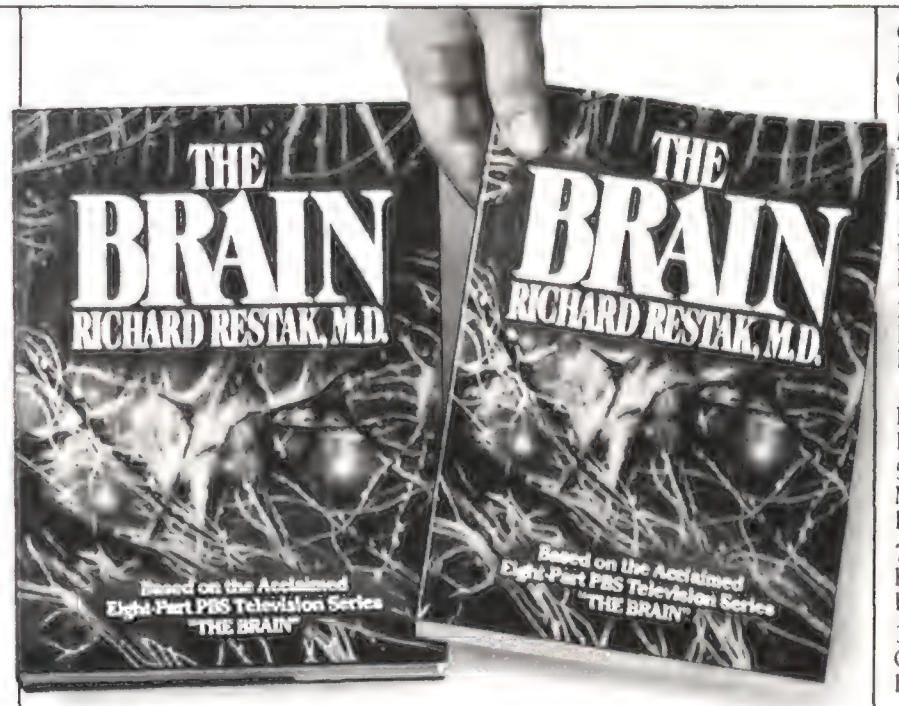
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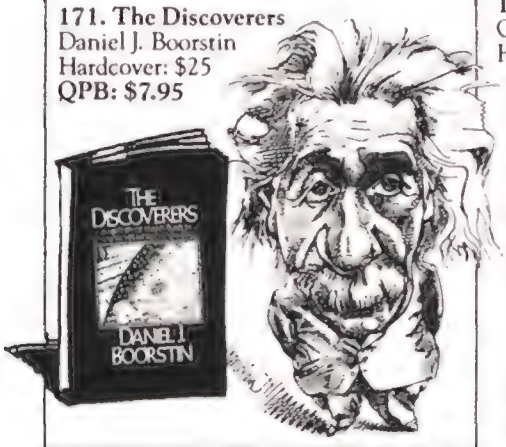

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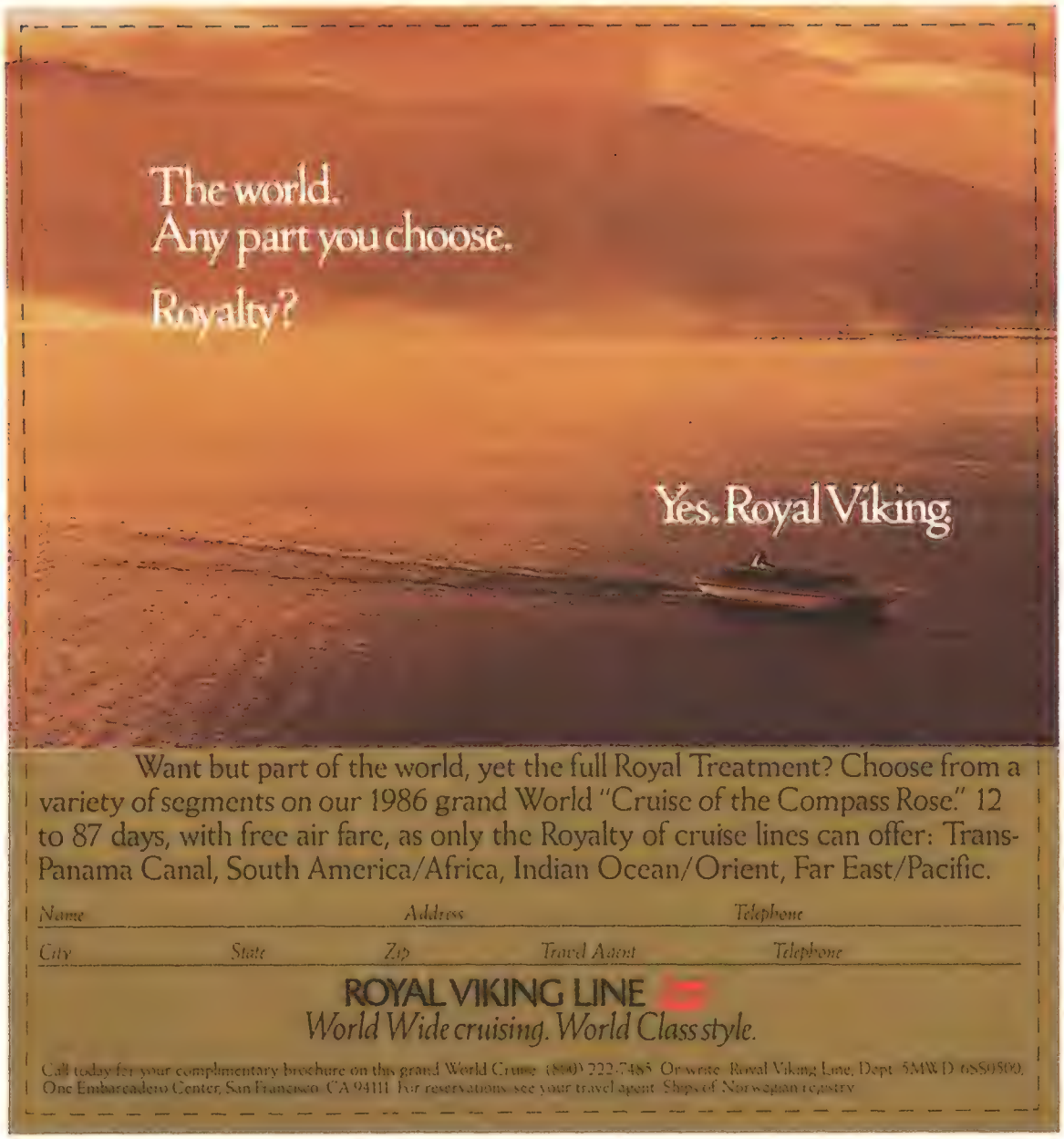

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of his 60-foot-high sculpture was on display recently in our *Automobile and Culture* exhibition, and it may be seen at the Detroit Institute of Arts between June 9 and September 9.
Elizabeth A. T. Smith, Assistant Curator
The Museum of Contemporary Art
Los Angeles

Fondation Cartier, Jouy-en-Josas

Arman's *Long Term Parking*

Can animals think?

Dear Sir: Whether there is consciousness in animals is a time-honored issue, dating back at least to the 17th century. René Descartes (1596-1650), philosopher and mathematician, in his *Discourse on Method*, denied consciousness to animals, whereas rationalist metaphysician Gottfried Wilhelm Leibniz (1646-1716) attributed to them perception in *Monadology*. Indeed, John Locke (1632-1704), philosopher with training in medicine and the biological sciences, affirms: "For if they have any ideas at all and are not bare machines (as some would have them), we cannot deny them some reason. It seems evident to me that they do (some of them in certain instances) reason. . . ."
Gilbert Shoham
Kansas City, Missouri

Dear Sir: In addition to taking care to avoid damage to nests and young plovers, I would like to say that we spend considerable time delivering gentle minisermons on conservation while politely steering picnickers and dune buggies away from nesting areas. And to acknowl-

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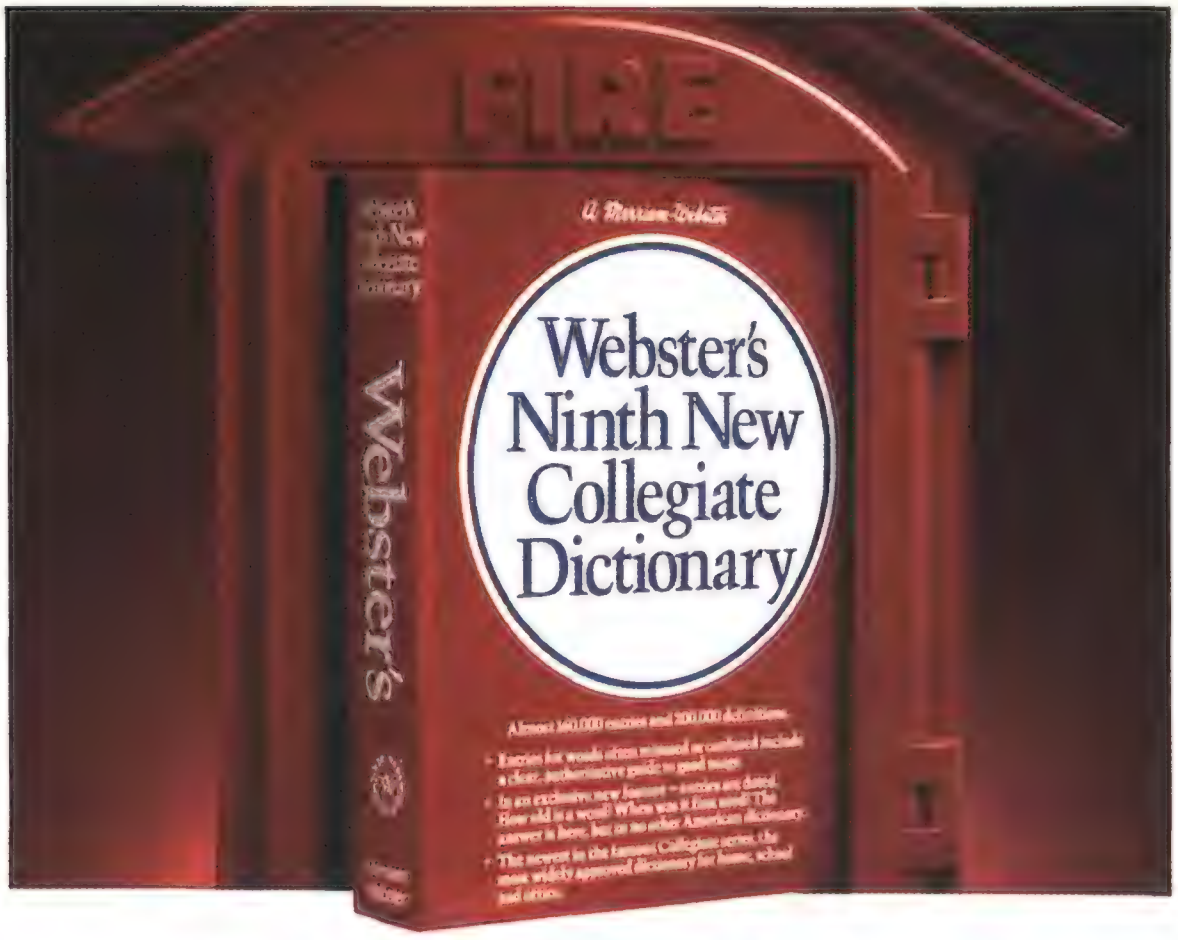

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edge the valuable support our research receives from the Nature Conservancy, which has permitted us to use its land and its facilities.

Your captions for the photographs of the plovers' silent "low run" and "broken-wing display" need clarification. The bird is difficult to see in a low run, which takes it safely away from the nest. Then, it may begin vocalization or a broken-wing display to distract the intruder.

Carolyn A. Ristau, PhD
The Rockefeller University
New York City

Dear Sir: Two years ago, while fly-rodding, wading above the fall line of the Rappahannock, I came upon a nesting bluegill in a shallow backwater. As I prepared to cast, a large eel, swimming upstream, approached the nest and stopped at its edge. The bluegill backed up but did not leave. Then two large, dark bluegills emerged from the tall grass near the nest and joined the nest keeper. A second or two later, as if on signal, the three fish attacked the eel, biting or butting him in the sides. Mr. Eel departed posthaste. The entire episode lasted about 15 seconds.

It was quite evident that the nesting bluegill sent out a call for assistance which was answered immediately and, as the fish lined up like the old horse cavalry, one signaled something like *Charge!*

C. B. Cushing, Lt. Col., USA (ret)
Bowling Green, Virginia

Dear Sir: As a biologist who grew up on a dairy farm, I find it difficult to imagine how anyone, scientific or otherwise, could doubt such a common-sense notion as the consciousness of animals.

Our cows all knew their stalls. When they were on summer pasture we would put grain in their mangers before they came in to be milked. Heavy milkers would get the most. One particular cow would always try to be among the first into the barn, where we would find her standing innocently in her stall. But grain would be missing from one or more of the heavy milkers' mangers. We mounted a watch, and indeed she was the grain thief. She would find a manger with a big pile of grain, hurriedly slurp it down before she got a hard head in her ribs from the rightful occupant and then go on to her own place.

Robert Engstrom-Heg
Oneonta, New York

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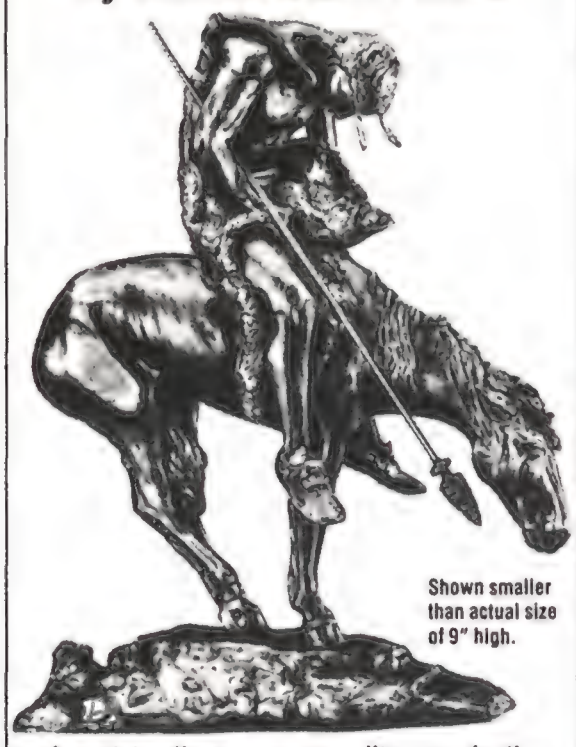
by James Earle Fraser



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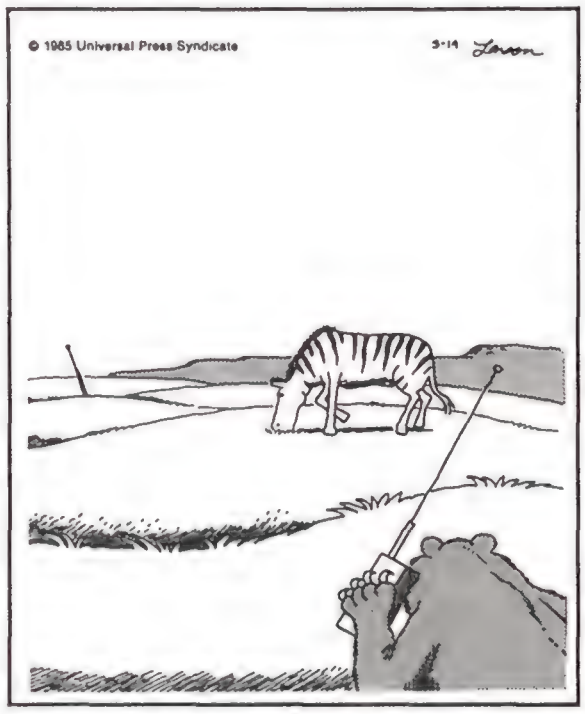
Dear Sir: I read Alison Jolly's article with great interest. Did cartoonist Gary Larson participate in the research?
Fred McBride
Alexandria, Virginia
Mr. Larson (see below) did not. Great minds. . . . Ed.



The modern lion.

Dear Sir: Alison Jolly says "It is probably impossible to prove that animals are conscious." A survey of human behavior, from the political scene to your local supermarket, will suggest that the same must be said of most of our species.
David Korr
New York City

Richard III

Dear Sir: Your article is the latest in a long series of recurring features on royalty which is not only inappropriate here in America; it is a royal pain in the neck.

The trivial and evil extravagances of nobility, whose only claim to fame and mayhem is the biological accident of birth, is out of step with the national character of our American heritage. Need I remind you that we fought a bitter Revolution in 1776 to rid ourselves of this royal nonsense?
Eugene F. Todd
Cheyenne, Wyoming

Dear Sir: It is worth mentioning that Sir Thomas More was only five years old when Richard was killed at Bosworth Field, and was educated in the household of Cardinal Morton, Richard's deadly enemy. His opinions in the matter were clearly hearsay, though he probably believed them quite sincerely.
M. J. Carlson
Little Compton, Rhode Island

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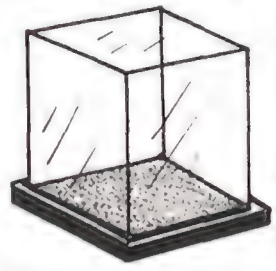

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Dear Sir: Henry Tudor's Lancastrian claim was derived from his maternal great-grandfather, John Beaufort, Earl of Somerset, eldest of the illegitimate children of John of Gaunt and his mistress, Catherine Swynford. The Beauforts were legitimized by act of Parliament in 1397, soon after their parents were married.
Sylvia Koschara
Traverse City, Michigan

Dear Sir: All countries have come forth in travail and have had their murderers handy. One can see why and how a justice system had to evolve, in order to have any population or leadership at all left to function.
Winifred M. Brown
New York City

Dear Sir: Your readers may like to know that last fall Britain's Channel 4 presented "The Trial of Richard III," almost four hours long, in a studio mock-up of an Old Bailey courtroom. A former Lord Chancellor of England was presiding judge and two of England's best Queen's Counsel were prosecution and defense. Voluminous testimony from academics, art historians and forensic pathologists sought to prove or disprove Richard's guilt in connection with the death of the Princes in the Tower. Verdict, in the closest thing Britain has had akin to a nationally watched trial: not guilty.
William Hogarth
Chairman, Richard III Society, Inc.
Sea Cliff, New York

George Stubbs

Dear Sir: George Stubbs may have proclaimed that nature was superior to art, but quite certainly, while in Italy, he spent some time studying one of the most famous antiquities of his day, *Lion Attacking a Horse,* on Capitoline Hill. His numerous paintings of the subject are really imaginative variations on this once well-known sculpture group.
William E. Wallace
St. Louis

Standardization

Dear Sir: I have lived in several foreign countries and so have had to cope with different electrical systems and units of measurement, driving on the left, and the way in which the date is abbreviated (in

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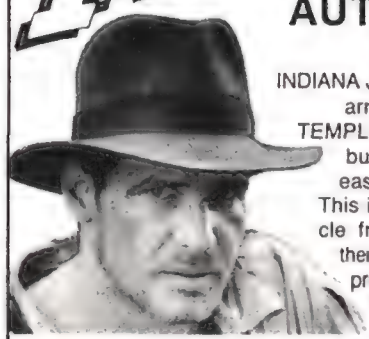

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most countries the day comes first, then month, then year).

Because of this I have always been for standardization and feel, with John Quincy Adams, that the metric system is by far the best. In 1866 an Act of Congress made it lawful to use the metric system in the United States. Still, we are the only major country not fully metric.

I believe there are two reasons Americans resist changing: the advantages have never been fully explained, and we mistake uniformity for conformity.

George C. Schmitt
Syracuse, New York

Dear Sir: Back in my childhood days of going shopping with Grandma, the wearer-to-be of a pair of socks had to make a fist, and if the sock met heel-to-toe around the fist it was the correct size. To mark off an inch without a ruler, the length of a grown-up's thumb's first joint was a pretty fair measure. For a yard of cloth or ribbon, lacking a tape, you held the end to your nose and pulled the material out to the full extent of your arm. In cooking it was "a lump of butter the size of a walnut" and "warm the oven until a piece of paper turns light brown."

Joan F. O'Brien
St. Charles, Illinois

Mall

Dear Sir: I've felt a vested interest in the Smithsonian since age three when my mother helped to write, and my sister illustrated, the first Navajo Primer under the direction of Dr. John P. Harrington, then Senior Ethnologist of the Institution. I can't believe Mr. Park left him out of his list of "characters."

He was a familar figure on the streets of Washington, walking in great strides with a stack of papers topped off by a bottle of ink. A huge man, he rarely found time to bathe or change his shirt. With him we lived through works on the Mojaves and Aleuts, the compilation of a French/Aztec dictionary and more. He left a legacy of Harringtonisms: the parting shot to a real dolt, "It's been an education meeting you," and simply responding "My, my" when someone went on endlessly about something in which he had absolutely no interest.

Jacqueline Danner Taylor
Williamsburg, Virginia
For an article on Dr. Harrington, see the April 1984 issue. Ed.

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Phenomena

Dear Sir: As an extension of Mr. Wiley's thoughts on the benefits of rooftop gardens, I would like to suggest oases of greenery and trees in parking lots, which suffer the same extremes of temperature and moisture as rooftops, bad for their pavement surfaces and also for the vehicles parked in them.

I propose a zoning law requiring a planted area of a square yard or so with a tree on it for every five or ten parking spaces. The cost would not be great and it would result in very little diminution of parking space. Apart from the practical and ecological benefits, this would beautify the sprawling, ugly parking lots of suburban America.

James B. Cole
College Park, Maryland

Dear Sir: A favorite roof of mine is the large flat one of a commercial building in Queens, visible from an elevated rail line of the New York subway. Going to the 1964 World's Fair as a child, I was amazed to see patches of grass growing on this roof. I have continued over the years to check on its progress.

The few clumps of grass trapped ever more soil and spread across most of the roof. Apparently this caused no trouble to the occupants of the building, for the roof was never cleared. In 20 years the grass attained three feet of lush growth and the soil built up to six inches. The few bare spots would fill with rainwater so that after a summer shower the roof looked for all the world like a marsh, an oasis enjoyed by various large birds.

Ronald LaClaustra
Brooklyn, New York

Family portraits

Dear Sir: My friend Robert L. Shaw owns an automobile-recycling business here in Pocatello, Shaw's Inc. A couple of years ago he received a postcard from an enterprising entrepreneur addressed to "S. Inc," making the astounding claim that she had catalogued the "Inc Family" and would sell him a "guide to the discovery and documentation of your personal and family heritage." The limit: only one to a household.

Chilton Phoenix
Pocatello, Idaho

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HORCHOW

Around the Mall and beyond

The first of this month marks the deadline for entries in the Second Great International Paper Airplane Contest. If as a subscriber to this magazine you are fortunate enough to get your May copy in late April, and if as a reader of this column you are so devoted that you turn instantly to it, then you still have time to whip up a little paper airplane, write your name, address, phone number and flight instructions on it and send it winging through the mails to the Museum of Flight in Seattle, Washington (9404 East Marginal Way South, for those so inclined). If, like most mortals, you get your magazine around May 1, you're just plain out of luck until the Third Great International Etc., Etc., Etc., which, judging by the 18-year time lapse between the First and Second Great Etc., Etcs., won't occur until the year 2003.

I might try to enter that next one, if my shaky old fingers permit, because with the help of my oldest grandson I have turned out some pretty formidable paper airplanes lately. If our design should win some part of that next contest, it may go on exhibit in the National Air and Space Museum, as will the winners in all categories and events in this year's contest. For besides being a lot of fun, the contest, jointly sponsored by NASM, the Seattle Museum of Flight and our esteemed journalistic colleagues at *Science 85* magazine, aims seriously at uncovering ideas that could be applied usefully to the design of real aircraft.

Take the standard paper dart that most kids make and compare its lines with those of today's delta-winged jets, including the Concorde, which howls across the Atlantic every day at supersonic speed. Those long noses and arrowhead wings can surely claim a few genes from that ancestral dart. Take the skinny-winged gliders that I have cut out of stiff, folded paper, and which, dropped from our third-floor deck, seem to take forever to spiral gently down to the parking lot below. Today's sailplanes with their high-aspect-ratio wings and incredible performance must certainly owe something to such experiments in paper.

And take the strange flying wing which my grandson fashions with bewildering skill and which flies superbly. Did our ultrasophisticated shuttles spring from the drawing board of some designer who, at age seven, tongue awry with the effort of precision, folded paper into that same mysterious configuration?

Early in aviation's history, the standard child's dart was forthrightly used, at least twice, as the basis for an airplane design. In 1867, J. W. Butler and E. Edwards of Great Britain came up with two full-scale dart designs, apparently to be propelled by jets of compressed air. One was a simple single dart, looking almost exactly like the paper version, the other was an ingenious double-dart design, the two lifting bodies attached side by side like the hulls of a catamaran. Neither, as far as I know, was ever built.

Intrigued by the double-dart concept, I recently managed to copy it, more or less. I folded two sheets of paper into twin darts, taped the edges of their wings together and joined their sharp noses with a canard wing of my own (enormously clever) design. I'm delighted to report that it flew beautifully—a stable, soaring flight that ended gloriously with a graceful ditching in the middle of a fishpond.

In 1905, the famous Brazilian aviation pioneer, Alberto Santos-Dumont, used a dart as the upper wing of an experimental plane design which (sensibly) he never tried to build or fly. I discovered a model of this brainchild when I went to check something in the library at the National Air and Space Museum, for it's in the fascinating collection that crams a huge glass case on the third floor. You won't see this exhibit unless you have a date with one of the NASM staff or some authentic work to do at the library or some other special dispensation. But the aircraft models illustrate the past 80 years or so of real or attempted flight. The best of them from time to time find their way into exhibits or special displays in the main

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galleries downstairs, so keep your eyes peeled next time you pay us a visit.

The models include arcane designs that didn't work and some that did but look as though they couldn't. In the Gallery of Early Flight on the first floor, for instance, is a model of Santos-Dumont's *14-bis* (pp. 36-37, top), a strange marriage of box kites and engine which is credited with making the first flight in Europe.

The notion of using kites as the lifting surface died hard with a couple of inventors. One was none other than Alexander Graham Bell, who fashioned a massive kite made of more than 3,000 cells, each with a V-shaped lifting surface. This "tetrahedral" arrangement rendered the whole device exceptionally stable and gave it enough lift to hoist a man 170 feet into the air when towed across a Nova Scotia bay by a steamboat in 1907.

The other inventor was an Australian, Lawrence Hargrave. Like Bell, he had a restless and enthusiastic mind and was obsessed with the idea of stable flight. Never mind being first in the air; just get there safer.

Hargrave, who had invented the box kite back in 1893, hoisted himself into the air under a series of them, and being a fine mechanic set about building an engine that would shove the whole arrangement forward and so give it lift.

He never quite got his act together, but in 1905 a young Frenchman, Gabriel Voisin, made two moderately successful gliders out of box-kite wings and tail. Santos-Dumont adapted that Voisin design for his *14-bis*. He switched the box-kite tail around to become a controllable canard in front, and he mounted a 50-horsepower engine and a pusher propeller behind. He angled his main wing—six box kites joined together—up from the fuselage to form a shallow V, the dihedral angle which gave the craft its much-prized stability. And in 1906, with its engine sputtering away and the brave Brazilian standing upright in a sort of basket mounted in front of the main wing—trying desperately to keep from stubbing his canard—*14-bis* hopped into the air for 60 meters to the delight of all Paris.

But, you say, this was three years after the Wrights had first flown. Sure, but the Wrights flew in obscurity and kept a low profile until they had perfected their Flyers to perform real flights, not just hops. In contrast, Alberto Santos-Dumont

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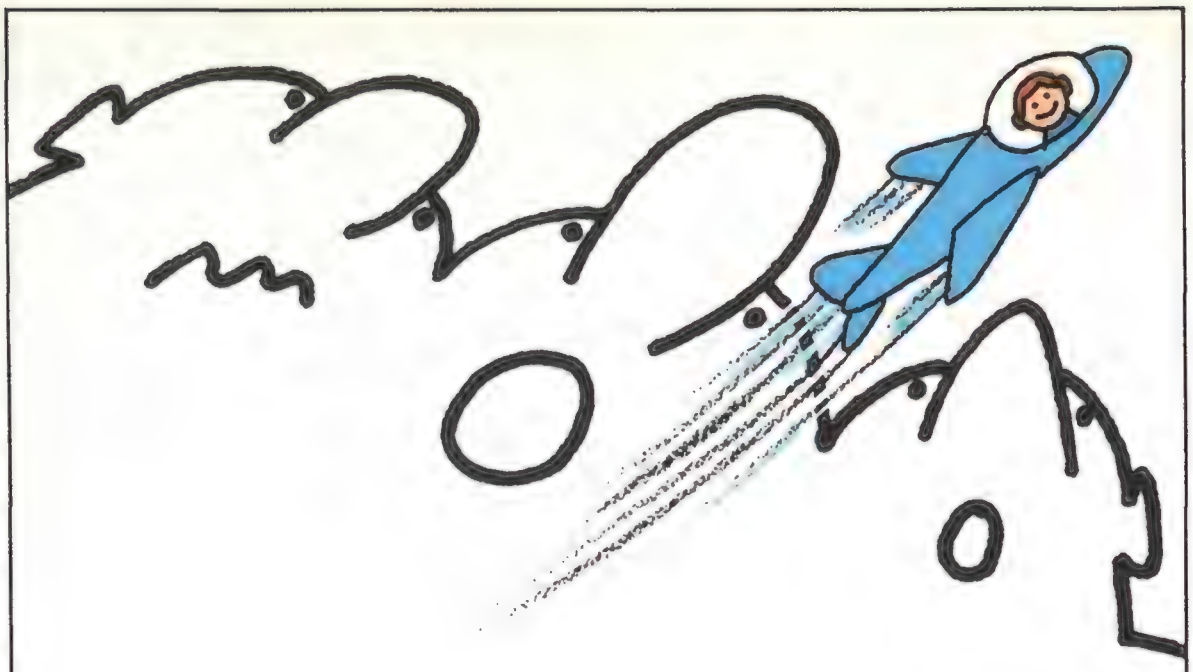


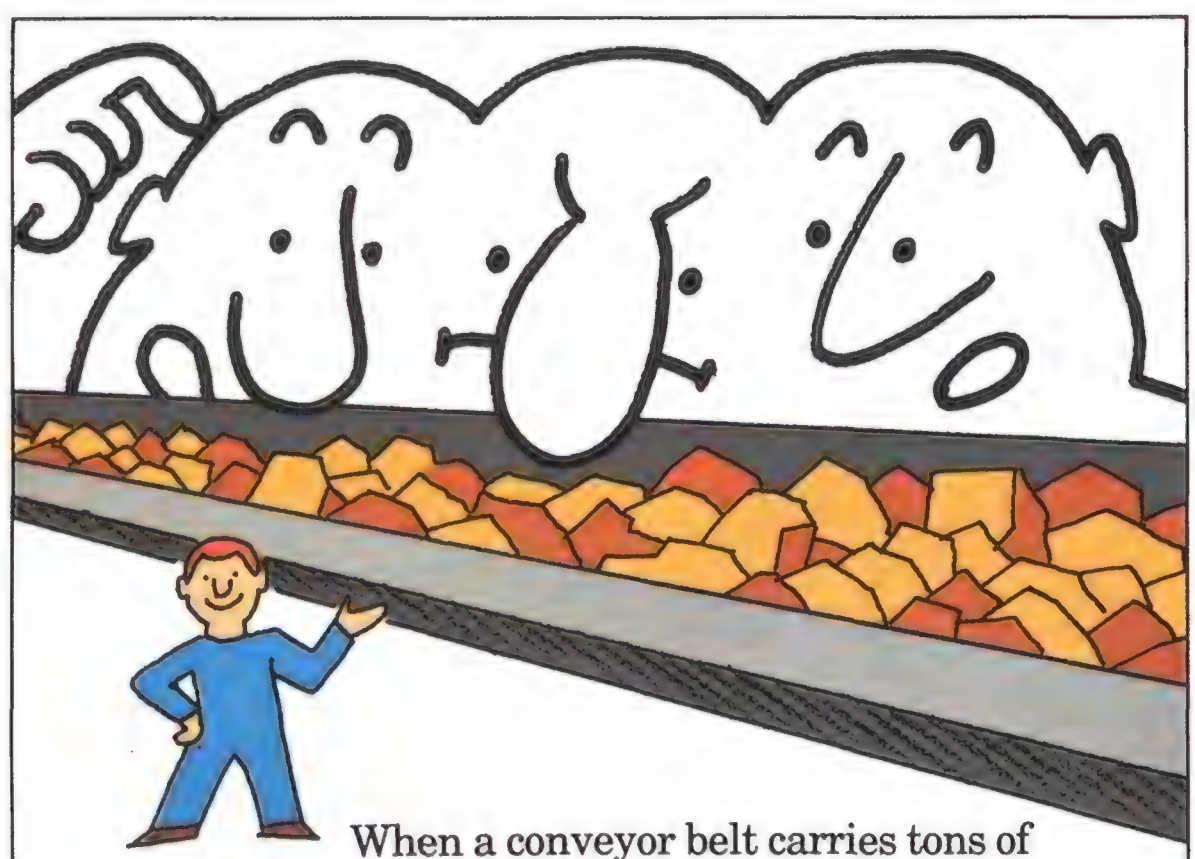
They say there's nothing better than steel for making airplane brakes. But Goodyear said, "We'll see about that," and went on to build brakes made of carbon. They stop like steel, but weigh a lot less and last three times as long. So planes can save money coming and going.

Santos-Dumont's *14-bis* made the first heavier-than-air flight in Europe in 1906.

had a high profile for a short man. He was also very rich, and since Parisians tend to adore small and expensive items, they took Alberto to their hearts.

Another model in the Smithsonian collection indicates that the box-kite wing was a long time dying. It shows up again in *The Bird of Passage*, another Voisin plane, similar to the one in which the great Henri Farman, in 1907, became the first in Europe to fly a whole kilometer. It looks a little more flyable than *14-bis*, but not much.

Not too far from Santos-Dumont's *14-bis* in the Early Flight exhibit is a model of the *Ellehammer II*, a strange little flying wing with a sail stretched horizontally above it. Jacob Christian Ellehammer was a Danish inventor who produced a



When a conveyor belt carries tons of ore, the jagged rock can cause a little rip which may become a big tear. They say you can't prevent that. But Goodyear said, "Think quick," and created Sensor Guard,® an electronic system that shuts down the belt if it starts to rip. So minor problems can't turn into major disasters.

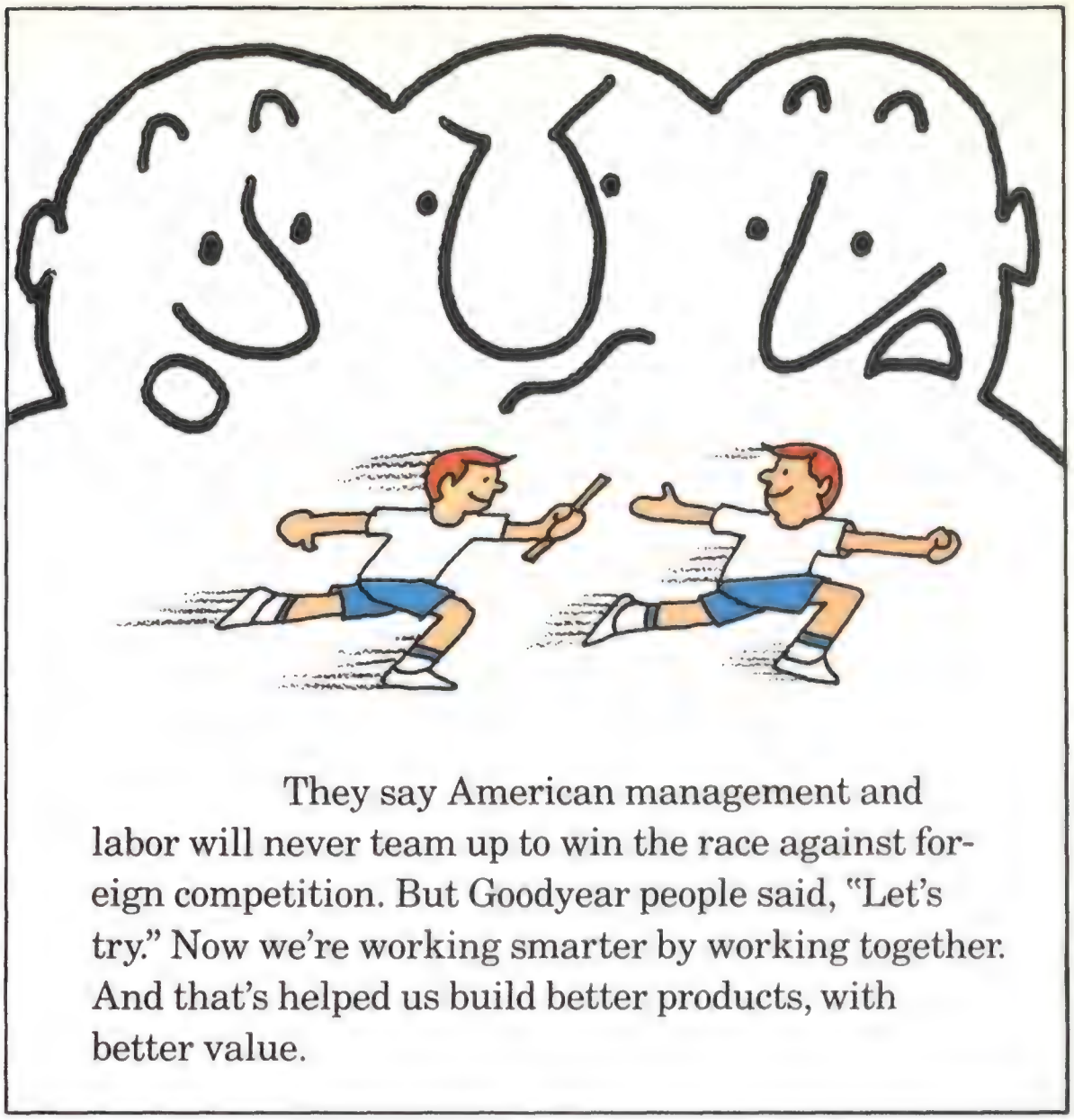
The Burgess-Dunne AH-7 hydroplane of 1914 was purchased by the U.S. Navy.

The box-kite principle was the basic design feature of this canard aircraft.

motor scooter and a very early air-cooled radial engine. In 1906, he tethered his plane to a pole and got it buzzing around a specially made track. It was almost exactly like flying a powered model today. The difference was that Ellehammer was *inside* his plane, more or less controlling it; the tether simply served to keep it from going into the wild blue yonder. Anyhow, Ellehammer got about 18 inches off the ground, much to the joy of all Denmark.

One odd-looking model is that of the *Vlaiclu No. 1*, designed in 1910 by a Romanian living in Paris. Built on a long shaft, this plane had a complete horizontal and vertical stabilizer in front. The shaft drove two propellers, and gearing allowed them to contrarotate, eliminating their torque. Despite its appearance,

It was distinguished by its unusual design and beautiful camouflage.



They say American management and labor will never team up to win the race against foreign competition. But Goodyear people said, "Let's try." Now we're working smarter by working together. And that's helped us build better products, with better value.

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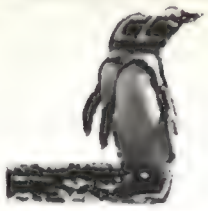

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the *Vlaiclu* performed well. At an aviation meet in Vienna in 1911, it won a prize for being able to turn on a krone and another for winning an event called the bomb-drop, an ominous indication of European thinking in those days.

In his fascinating book *Winged Wonders*, Tim Wooldridge, NASM's Chairman of Aeronautics and expert on flying wings, reveals the antiquity of this supposedly sophisticated design. It's traced to the seed of a Javanese vine, *Zanonia macrocarpa*, a kidney-shaped body with a natural airfoil which enables it to soar steadily for long distances.

One designer who knew about the *Zanonia* seed was John William Dunne, an English veteran of the Boer War who was also an author and philosopher. Dunne experimented with flying wings and in 1910 produced a tailless biplane, the wings sharply swept back, their airfoil and angle of incidence varying from center to tip. With a single engine driving two pusher propellers, the plane flew with grace and extraordinary stability.

The rights to build Dunne's plane in the United States went to W. Starling Burgess, son of a noted naval architect and famous himself at the skill. He had built and flown seaplanes, and in 1914 he put floats on the Dunne design and tested it. Though it flew beautifully, the Army bought only one, the Navy two.

The Burgess-Dunne "flying wing" is remembered in one of the prettiest models at NASM (pp. 36-37, bottom). When I called on it to pay my respects, it had moved to a case on the first floor by the museum shop where everyone could honor it. Not too far away is the full-size, highly successful N-1M Flying Wing, Jack Northrop's experimental model, which led to the giant, graceful, but ill-fated flying-wing bombers of the late 1940's.

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So did a lot of paper-model makers. Including grandfathers and grandsons.

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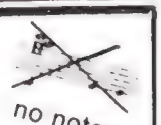

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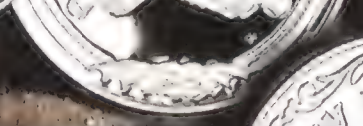

The coins in this collection will bear the first new coinage portrait of Queen Elizabeth II to be issued in 20 years. Shown actual size. Diameter: 38mm.

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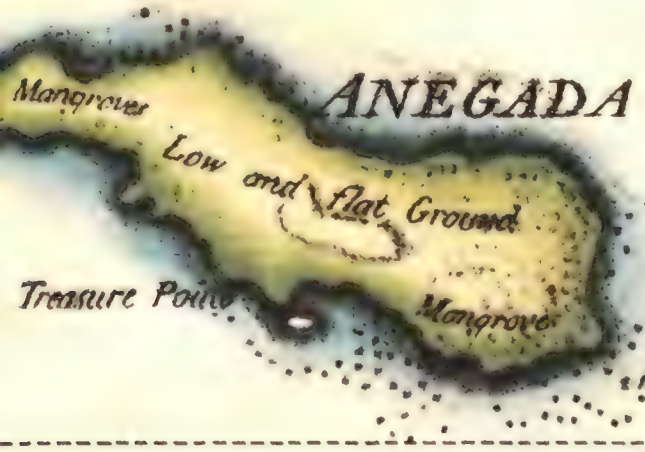

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Phenomena, comment and notes

Seals and penguins have adapted to the 'surplus' krill left by the decline of whales in Antarctica

Sometimes it is difficult to believe what the mind knows to be true. I have that trouble with a lot of things, one being cold water. My mind knows that generally the cold, dark oceans of high latitudes are richer in life than the clear waters closer to the Equator. But cold water appears so inhospitable to me that I have trouble accommodating the facts. Antarctica is the extreme case in point. In pictures, the land looks so lifeless and the water so forbidding I forget that all those penguins and seals along the edge of the ice must be eating something.

The director of the British Antarctic Survey has come to my aid. Richard M. Laws, in an article in *American Scientist*, traces the ecosystem of those cold waters, following a food web that measures consumption in millions of tons. Along the way he spells out what our removing so many whales has done to those rich seas.

Around the turn of the century, according to Laws, there may have been 1.1 million baleen and sperm whales spending part of their year in Antarctic waters, which he works out to about 45 million tons of biomass. Each season they would have eaten 190 million tons of krill, 14 million tons of squid, and perhaps five million tons of fish. By 1973, he continues, their numbers were down to half a million and their biomass down a lot further, to just nine million tons. By then they were eating 43 million tons of krill, six million tons of squid, and perhaps 130,000 tons of fish.

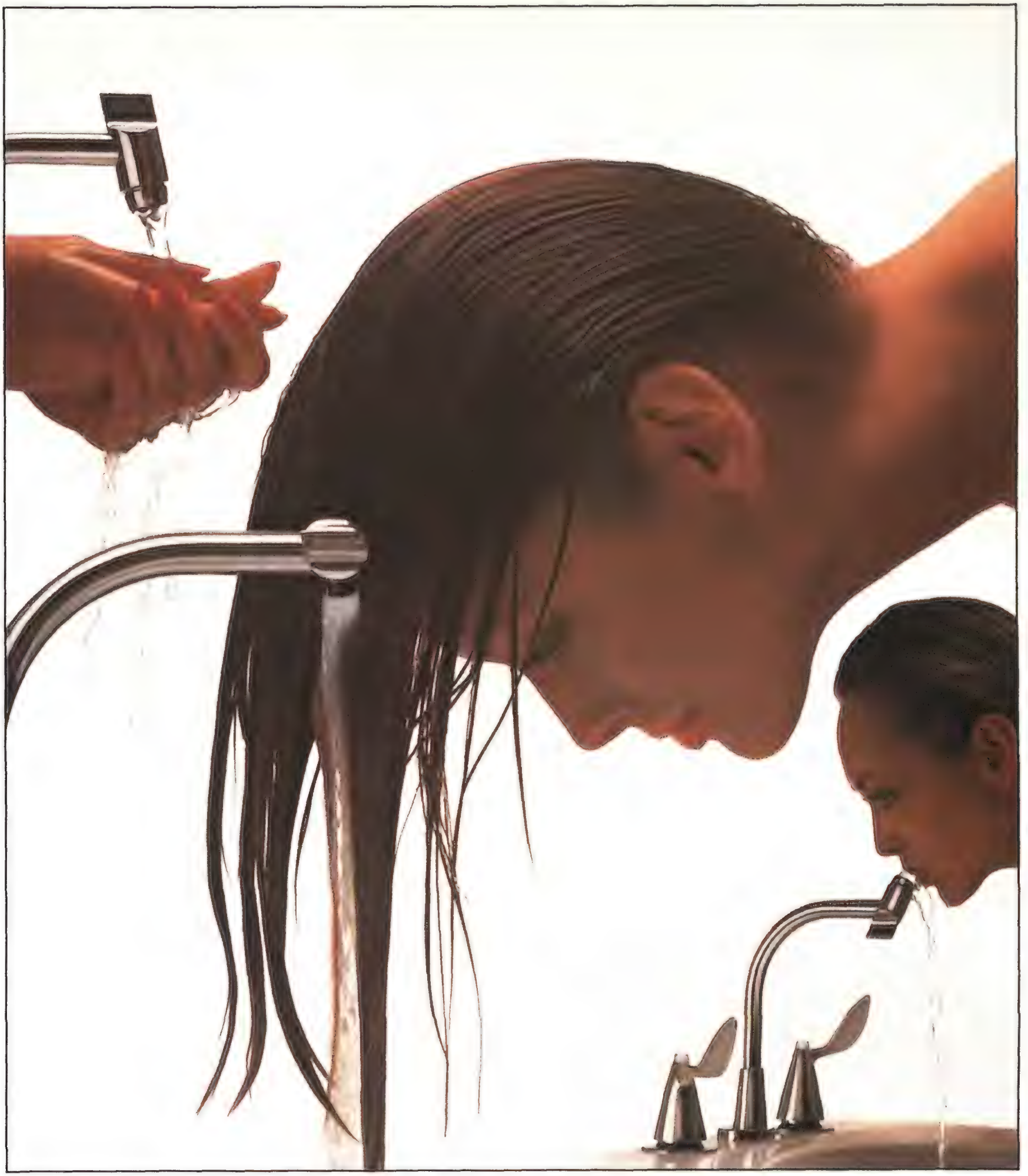
It would seem at first reading that the decline of the whales has left the Antarctic with a surplus of 150 million tons of krill every year, a quantity twice the combined catch of all the world's fisheries. The thought even gives rise to a vision of the Southern Ocean slowly turning into a sea of crustaceans, a cold shrimp bisque.

In real life, however, other predators have moved in, adjusting not only their numbers but their biology to take advantage of the bonanza. Laws estimates that both the seals and the birds of Antarctica have upped their consumption from 50 million to 130 million tons a year each. Consumption of krill by fish is down (the fish themselves are under pressure from human fishing), but this is balanced out by an increase for squid.

As Laws follows the food web, the season begins even before the pack ice melts. Layers of algae growing on the ice are brown-tinted. Their color helps to absorb heat from the sun and hasten the melting of the ice. Once the ice does melt, these algae seed the water, giving the season a head start. Tiny, free-floating plants called phytoplankton, bathed in nutrients by upwelling currents, grow explosively. Protozoans, one-celled animals, appear to graze on them.

It is the next level in the water food chain that is the key to Antarctic ecology, however: the two-inch, shrimplike crustaceans known as krill (SMITHSONIAN,

Young Adélie penguins, which eat krill, grow faster than penguins that eat squid.



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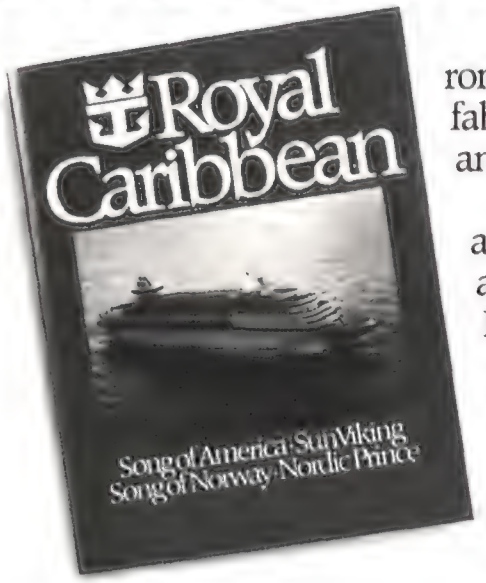

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November 1984). They are not the only zooplankton (small free-floating animals) in Antarctic waters, but one species alone, *Euphausia superba*, probably accounts for half of the total zooplankton biomass. They are unusual, in that they are considerably larger than the regular run of copepods and amphipods, hydrozoans and fish larvae that make up the zooplankton. An efficient "basket" of filters around their mouths, together with their size, means they can feed on a much greater size range of food than their competition. They are also unusual, and possibly unique, for a planktonic animal in that they appear to live for as long as seven years. They often cover square miles of ocean; one school was estimated to weigh in at close to two million tons.

Krill in turn are the most important food for the squid that form one of the chief links in the food web. Whales, birds and seals feed on squid, consuming on the order of 35 million tons a year. These same squid, Laws points out, may in turn have eaten 100 million tons of krill. Antarctic fish eat another 100 million tons.

Birds are major krill predators. The two largest penguin species, the emperor and the king, prefer squid and fish, but the others concentrate on krill, which constitute three-fourths of all the food eaten by all the birds in Antarctica. And those that eat krill do better. Krill is more nutritious than squid, apparently, and the young of krill-eaters grow faster and fledge younger than the young of fish and squid eaters. The population of Adélie penguins (p. 42), which account for two-thirds of all the penguins in the Antarctic, is growing steadily, presumably because the decline in whales has left more food for them.

Similar phenomena are occurring among the seals, particularly the crabeater seals (p. 46). Laws says they are the most abundant seals in the world; their approximate 30 million population represents two-thirds of all existing seals and three-quarters of the total seal biomass. The age at which crabeaters reach sexual maturity apparently has been dropping, an adaptation leading to an increasing population. Again, this is thought to be a response to an increase in the effective food supply.

There still are whales, of course. And the baleen whales, those that use built-in strainers to feed on prey, still depend on

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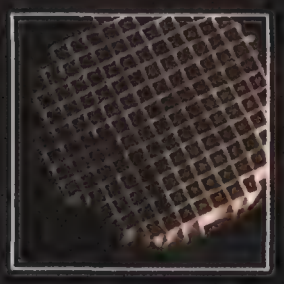

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Crabeater seals swim from pack ice. Already the most numerous seals in the world, they are doing even better with more krill available to them.

krill in the southern summer. When first born, baleen whales grow linearly. But they arrive on the Antarctic feeding grounds when they are about six months old and almost immediately weaned. Feeding on the swarms of krill, they begin to grow exponentially: their growth rate on a graph becomes an ascending curve instead of a straight line.

Surviving species of whales are taking advantage of the increased krill supplies as much as the seals and penguins. The pregnancy rate for fin and sei whales is rising, and their age at sexual maturity seems to be dropping. The age at which minke whales reach maturity may have declined all the way from 14 to six years.

As of now, humans are taking what by Antarctic standards is a trifling half a million tons of krill a year. Some think it could become a major fishery. If it does, Laws contends, growth ought to be slow enough to allow the ecosystem to come to a new balance. We created the present situation by killing so many whales; it would be a little much to turn around and kill off the beneficiaries.

John P. Wiley jr.

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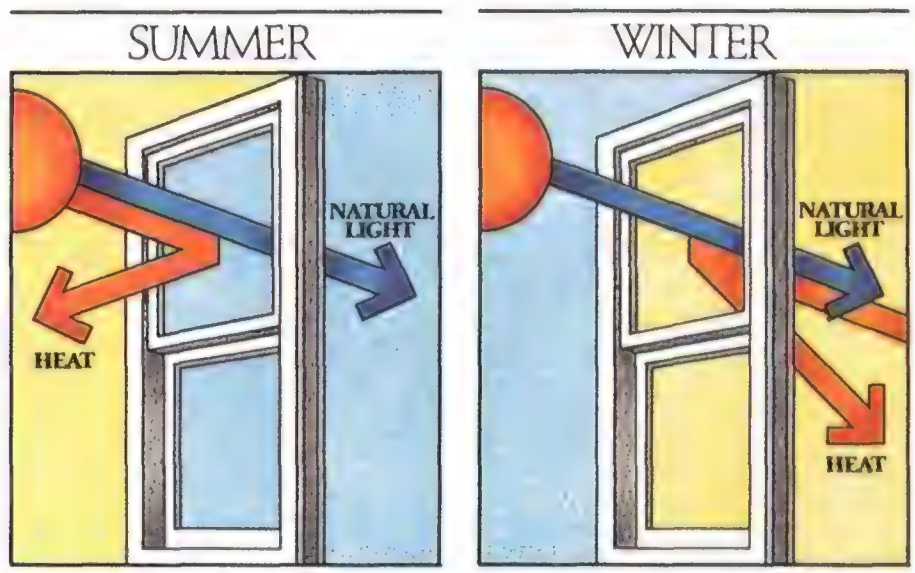

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by Alan Greenspan

Alan Greenspan, Famous Economic Advisor

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'Not that budget', the prominent politician continued. 'My budget. My checking's overdrawn. They're threatening to disconnect my phones. I even got into a shouting match with my wife when I tried to lay off the servants.'

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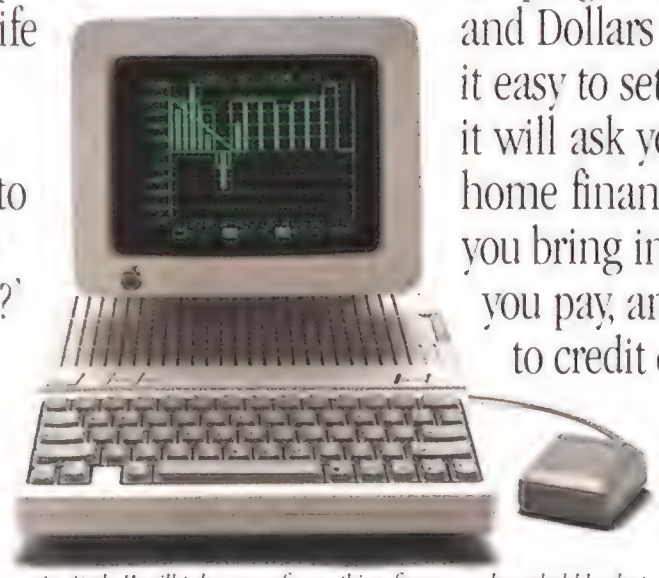

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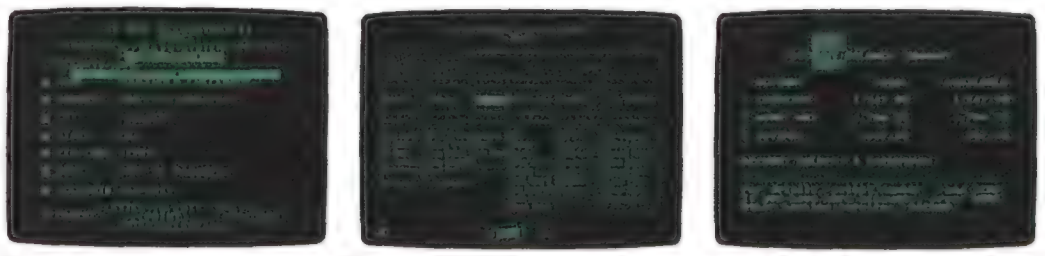

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On Cerro de la Neblina, "mountain of the mists," Pico Phelps looms over a variety of bizarre species, from a bristly caterpillar (top left) and unusual fern (top right) to recently discovered catfish and lizard.

By Donald Dale Jackson

Scientists zero in on the strange 'lost world' of Cerro de la Neblina

Camping on a misty Venezuelan mountain filled with strange life forms, a party of biologists found plenty to get excited about

Photographs by Robert Noonan

The expedition members fixed their attention on the thickly-mustached, self-assured man who stood in the doorway of the dusty, white-walled little house in the Venezuelan village of San Carlos de Río Negro. The 35 scientists and journalists in the group had already idled through one restless week awaiting the completion of elaborate travel arrangements, and they had no idea what was coming next. For many, this was the first good look at their leader, a remarkably talented, proud and complex 46-year-old Venezuelan named Charles Brewer.

A decade earlier Brewer had been a successful dentist in Caracas. Later he had served as his country's Minister of Youth. But he was also a man obsessed by the wonders of the strange and remote flat-topped mountains that Venezuelans call *tepuis*. Arthur Conan Doyle set his brilliant 1912 science-fiction novel, *The Lost World*, on a *tepui* called Roraima. The group now gazing appraisingly at Brewer was headed for one of the largest, most isolated and most mysterious *tepuis*, 10,000-foot-high Cerro de la Neblina—the mountain of the mists. And Charles Brewer, who knew the *tepuis* better than anyone alive, was charged with getting them there.

Brewer's talk to the restive group was a blend of wit, bravado and sober warnings. He cautioned them to remain low when boarding or leaving the helicopters that would ferry them from their base camp to the top of Neblina—"else you will be, ah, purée." He reminded them that the expedition was a joint venture, supported by scientific institutions in both the United States and Venezuela, and by the Venezuelan government. When confronting officialdom, he advised, "Don't act suspicious. Show the *good* American side." He finished by announcing that the party would begin the next phase of their odyssey, a four-hour ride in large, motor-equipped canoes called *bongos* to the frontier outpost of Santa Lucía, near the borders of both Brazil and Colombia, on the following day.

Their business was collecting specimens

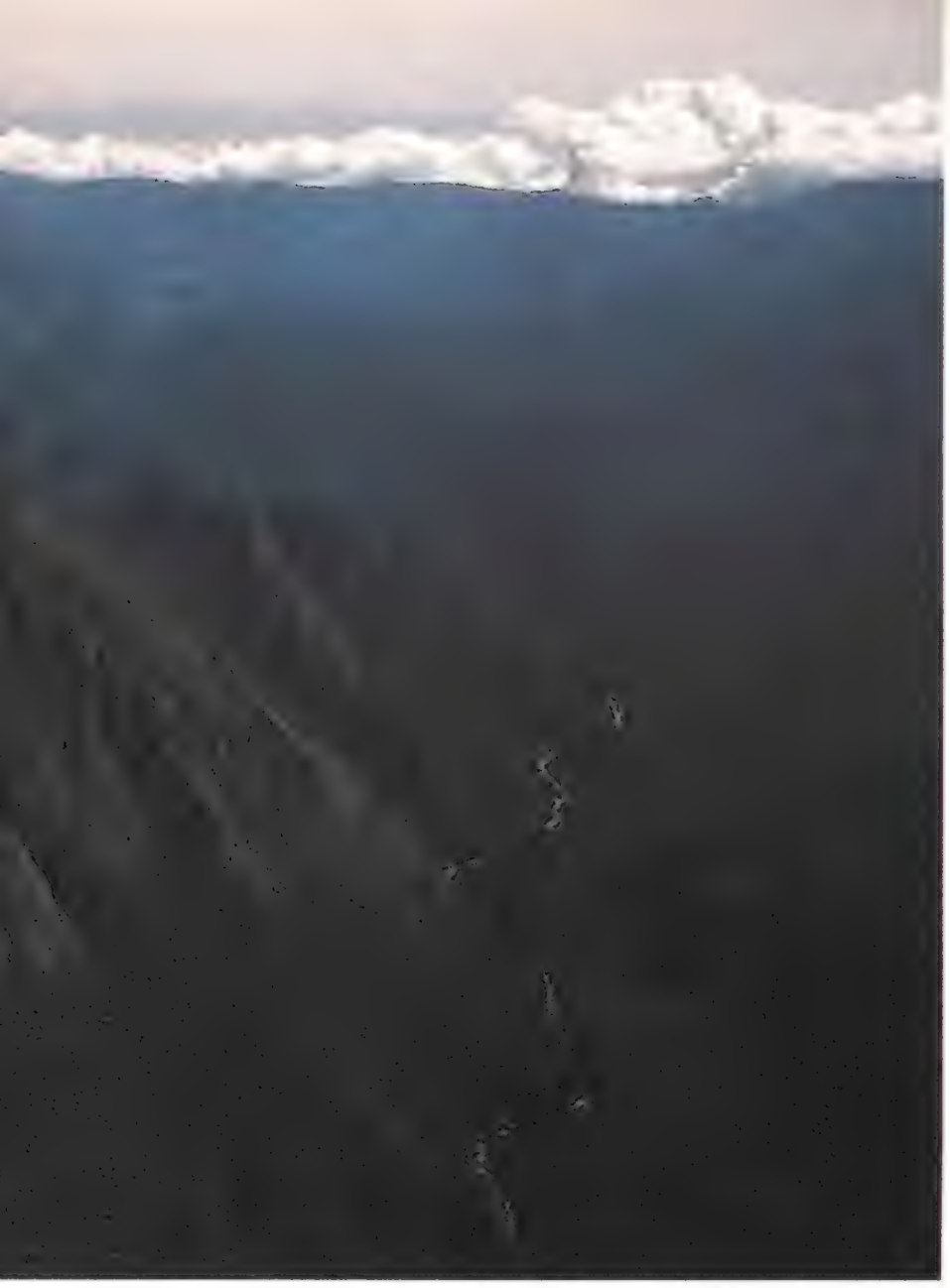
The men and women who gathered early the next morning on the rock landing that served as a *bongo* dock were notable both for the prestige of their affiliations—the Smithsonian's National Museum of Natural History, the Field Museum of Natural History in Chicago, the New York Botanical Garden, Harvard University and the Central University of Venezuela, among others—and for their commitment to interdisciplinary synergism. They included botanists, entomologists, ornithologists, herpetologists and a mammalogist, and their business was primarily collecting specimens of the exotic biota they expected to find on and around Neblina.

Neblina is what is known as a *tepui*, an isolated, mesa-capped mountain with its own unique ecosystem.

Most of the 25 scientists were Americans, but the group also included two Venezuelans, a West German and a Canadian. Roy McDiarmid, a bearded, easygoing U.S. Fish and Wildlife Service herpetologist was the main organizer for the American contingent. Some of the scientists, like McDiarmid and botanists Vicki Funk and Bill Buck, had been to Neblina on previous trips as part of the same project, dating back to January 1984, but this was the first expedition burdened with journalists—ten in all, including a film crew. This time the lost world would be going public.

In the days preceding their introduction to Brewer in San Carlos the scientists grumbled and wisecracked about the delay, speculated about their invisible leader and exuberantly discussed what they hoped to find. Joe Beitel, a sharp-witted botanist from the New York Botanical Garden, had invented what he called "the Neblina board game": it included such instructions as "Leave New York in a blizzard—back two spaces," "Helicopter fuel delayed—return to Caracas," and

A frequent contributor, Donald Dale Jackson spent nearly three weeks in Venezuela this winter with photographer Robert Noonan.



It is situated on the border of Brazil and Venezuela. Scientists mounted a major expedition there this year.

"Hammock not secured properly—lose face." Players also collected "*No problema*" cards bearing the often-heard South American assurance that everything would work out all right. Rumors about Brewer swirled constantly: he was politically controversial, someone had threatened to kill him, and so on.

But the subject that the group returned to repeatedly, compulsively, was Neblina itself, and the surprises and lessons it might hold. David Benzing, a plant ecologist from Oberlin, pointed out that Neblina and the dozens of other *tepuis* found mainly in Venezuela and peripherally in Brazil, Colombia, Guyana and Surinam, were ecological islands, isolated by their steep cliffs and their elevation from the lowland rain forest surrounding them. Their life forms had thus probably evolved independently, though species dispersal from other high-elevation habitats in the Andes was also possible. Botanists on earlier forays to *tepui* habitats had estimated that about 75 percent of the plants there were found nowhere else. Many of the amphibians, birds, insects and mammals, the scientists suspected, were likewise limited to this highlands environment. The researchers wanted to know what adaptations to the harsh, cool and wet conditions

Expedition leader Charles Brewer (left) briefs Alfredo Paolillo and Roy McDiarmid (center) before the trip.

Party of 35 took *bongos* downriver to small village, helicoptering to base camp next day, then to plateau.

In base-camp laboratory, ornithologist Dave Willard skins bird specimen while John O'Neill reviews notes.

there had evolved in the plants and animals and what their histories could tell us about the tempo and character of evolution itself.

Lurking beneath the scientists' buoyant eagerness to investigate this mysterious realm was an appreciation of some of the risks involved. Helicopters were fragile and uncertain conveyances on a mountain raked by strong winds and clouds that formed daily; would the expedition's two choppers and their fuel supply hold out for the 30 to 40 days the party planned to spend at Neblina? Specimen collectors on previous trips had been stranded without food for several days when helicopters broke down. The risk of malaria and other tropical diseases worried some, and the expedition, though topheavy with PhDs, was without a medical doctor; the nearest hospital, moreover, was several hundred miles away. Twenty-foot-long anacondas, electric eels and piranha fish, tarantulas and scorpions and jaguars all dwell in the forest around the base camp or in its streams; an anaconda with a head as large as a spaniel's had been seen earlier in a stream where expedition members bathed.

It was midafternoon when six of us plus a boatman crammed ourselves and our gear into a small, weather-beaten *bongo* and nosed into the current of the tea-colored Río Negro. Two larger boatloads had left that morning, and another was to follow the next day. The tropical forest, its leaves tinted a half-dozen shades of green mixed with splashes of red and yellow, bulged from the banks on either side. A pair of macaws blazed scarlet against the blue sky. Lonely, thatch-roofed Indian villages perched tentatively on the shore at ten- or 12-mile intervals, frail incursions into the enveloping green. We reached Santa Lucía, a village with a dozen huts and a small detachment of border guards, just before dusk. A volleyball net was incongruously strung across the path in front of the

Possibly attracted by salts from bath soap, butterflies gathered at a river's edge near expedition base camp.

Female of a new tree-frog species was collected at camp on mesa. Toes are especially suited for climbing.

Common sight on *tepui*, the bladderwort flower belies its plant, which traps and digests tiny organisms.

Extremely rare arboreal lizard found near base camp has a short, spiny tail like its terrestrial cousins.

huts. Orange, 55-gallon fuel drums marked KEROSINA CHARLES, for Charles Brewer, were piled near a small helipad hacked out of the brush.

The next day, Bell Ranger helicopters ferried us to the base camp. The 30-minute ride took us over a green carpet broken by streams that looked like carelessly dropped silver threads. Our first glimpse of our ultimate destination, a vast colossus of a mesa, filled the copter window from at least 25 miles away. Its borders were blurred by wispy clouds and its seemingly level top was overlaid by a film of mist that appeared to extend precisely as far as the mountain did, like a thick tablecloth. No one who was seeing it for the first time was prepared for Neblina's immensity.

The base camp consisted of a half-dozen structures clustered near a burgundy-colored stream. Three tin-roofed, open-sided wooden buildings served as dormitories where we slung our hammocks; one was sectioned further into a makeshift laboratory.

"I can already smell the fungi!"

The scientists were busily at work, fanning out on narrow trails that extended several hundred yards into the forest and collecting plants, insects and lizards. Amy Rossman, a cheerful, wide-eyed fungus specialist from the U.S. Department of Agriculture, climbed out of a helicopter and enthused, "I can already smell the fungi!" Joe Beitel, having quickly zeroed in on several novel species of ferns, observed that they were engaged in "*¡caramba!* biology—you see something strange and you say '*¡Caramba!*' "

Brewer, who had become well versed in *tepui* science through his many expeditions over the years, conducted an impromptu seminar on the little beach below the camp. The *tepuis*, he explained, were eroded remnants of an extensive sandstone plateau that had once stretched hundreds of miles across southern Venezuela. The sandstone, of a particularly hard, weather-resistant character, had been deposited atop a base of Precambrian igneous rock. Erosion and uplift had sculpted the *tepuis* into isolated, mesa-capped mountains. Often the *tepui* streams drain inward, he said, and frequently a single river flows out of each mountain. The *tepui* soils are so nutrient-poor that only specially adapted or stress-tolerant plants can grow there. Many plants on Neblina are present on other *tepuis* as well, he pointed out, but each *tepui* had also evolved its own unique ecosystem.

Later, seated at one of the camp's three long mess tables, Brewer described the unscientific sensations that sometimes assailed him atop Neblina and other *tepuis*. "They seem like sad places," he said, "and mysterious. Like moors, maybe. It seems amazing that anything can live in that soggy soil. The plants don't

The artichokelike *Neblinaria* plants are an eerie, conspicuous sight in the open land on *tepui* plateau. Their tufts could be protective adaptation to intense sun radiation, high rainfall, low level of nutrients.

Caterpillar that looks like a cactus plant may secrete poison from glands at the base of its shiny spikes.

Neblina's striking terrestrial orchids thrive mainly in open, savannahlike highlands where the soil is peaty.

seem related to anything you know. Sometimes you hear voices. And it's so cold and damp that there have been nights when I trembled constantly. My eight-year-old son and I were marooned on Roraima once for five days without food. We ate plants and made tea. He wasn't afraid because he was with me." Brewer suddenly leaped to his feet and began stalking something a few yards away—"an animal, doing something strange," he explained. It turned out to be a wasp toting a tiny leaf fragment. "My eyes are adapted to spot anything odd," he said gravely. "I see everything."

He felt like a man on the moon

Brewer visited Neblina for the first time in 1970, as a member of a commission assigned to mark the border between Venezuela and Brazil, which crosses the southern portion of the mesa. The mountain's first trespassers were a group of scientists led by American botanist Bassett Maguire, who discovered the mesa and named it in 1953, and Venezuelan ornithologist William Phelps jr. Botanist John Wurdack of the Smithsonian, a member of the Maguire party, recently recalled their trek: "Our Indian guides cut a path for us," he said, "but it still took ten days to find a break in the steep escarpment and get there. We stayed at the top for a month. It rained almost all the time."

The current expedition grew out of an association between Brewer and Roy McDiarmid that began in 1976. McDiarmid, then teaching at the University of South Florida in Tampa, was invited by a Venezuelan student of his to join a *tepui* expedition to Mt. Roraima to be led, improbably enough, by the student's dentist. The dentist was of course Brewer. McDiarmid was electrified by the experience. "I felt like Neil Armstrong, like I was on the moon. I hadn't been there five minutes before I found a frog I'd been studying for years but had never seen in the wild."

In the ensuing years McDiarmid accompanied Brewer on exploratory forays to other *tepuis*, and in 1982 they began discussing an expedition to Neblina. McDiarmid and James Luteyn of the New York Botanical Garden received grants totaling $100,000 from the National Science Foundation, and an equivalent amount largely from the Smithsonian Institution and the National Geographic Society. This, combined with the financial support provided by Venezuela, ensured a year's worth of fieldwork. The first band of scientists reached the top in February 1984, and the first major calamity followed soon afterward: McDiarmid, Smithsonian botanist Vicki Funk and three others were stranded for ten days on top with a three-day food supply. They subsisted on coffee, a handful of bouillon cubes and soup made from hearts of palm and the bird specimens they collected, but McDiarmid lost 30 pounds and most of his energy. Brewer led four more scientific parties to Neblina between March and December of last year.

Now it was Saturday, January 26, 1985, and the sixth expedition in the series was ensconced in base camp and roaring with eagerness to go topside. The helicopters were ready, the provisions and fuel supply seemed adequate, and the mountain bulked invitingly through the glassless windows of the bunkhouses. Sunday was devoted to preparation and a final briefing from Brewer: travel light, keep your sleeping gear with you at all times, don't try to hike out if you're stranded. At first light Monday, the initial contingent lifted off, but only two loads, including Brewer and McDiarmid and the film crew, reached the top before rain shut down further flights for the day. At 8:30 P.M. Brewer radioed from above that it was cold and wet and everyone was in his sleeping bag.

The dawn brought bright sunshine and the copters began shuttling groups of three and four to a plateau located more than a mile above the base camp. At midmorning photographer Robert Noonan and I were airborne. I could see now that the mountain's flat-topped, steep-sided profile was deceptive: we were flying up an enormous canyon filled with thickly bunched forest and spindly-trunked palm trees; a waterfall which looked as high as Yosemite Falls cascaded down one side. As we neared the middle of the canyon, I saw two bare peaks looming above the plateau to the south; the highest, Pico Phelps, ascends to 10,000 feet.

Suddenly we dipped down and landed on a level meadow near a tiny cluster of tents and tarps. As we stepped out of the chopper our boots sank into eight inches of dark water. The meadow was cluttered with leathery-leafed, knee-high plants with tufts bunched at the top of woody stems. Pitcher plants with cup-shaped leaves and delicate terrestrial orchids protruded from the spongy mire. Little palms rose from the higher ground around the meadow. The overall impression was tropical lushness gone slightly haywire.

"I didn't know they came like that"

"Every plant here is new to me," botanist Michael Nee said excitedly. This was *¡caramba!* biology in action. Phyllis Spangler clutched a bladderwort plant with a tiny yellow blossom poking from its stem and voiced in the simplest terms the exultation they all felt: "I didn't know they came like that." Phyllis and her husband, Paul, a 60-year-old entomologist with the Smithsonian's Museum of Natural History, had worked together around the world for 23 years, but they had never beheld a scene like this.

Brewer, clad as always in a collarless blue shirt, red

Plant ecologist David Benzing daubs isotope solution on plants to see if leaves absorb particular nutrient.

In a valley on Neblina's plateau, botanist Joe Beitel collects ferns among dense stands of *Brocchinia.*

belt and Sergio Valente jeans, prowled the meadow in search of photographic targets. "Many of the plants here have tufts like artichokes," he said. "It's apparently a protective adaptation to the intense sun radiation, high rainfall and lack of nutrients. We're in the heart of a nutrient desert. The shiny leaf surfaces reflect the light so they don't evaporate so much." He smiled wolfishly. "You should be surprised that I am a botanist, too," he said. Brewer was acting much more relaxed, more at home than he had seemed in town and camp. "I love this place, I am more comfortable here than in Caracas."

McDiarmid's eyes were shining with excitement. "I found a frog that I think is a new genus," he said, "and a clutch of eggs with it." The frog was small and dark, its color probably an adaptation for protection from the sun. "Most of the frogs here have evolved distinctive reproductive strategies," he said. "They have no larval stage. It's a way to deal with the high elevation and harsh environment, bypassing the stage where they're most vulnerable."

By late afternoon the tempo of *caramba*-punctuated discoveries was slowing, though someone had plucked a foot-long earthworm from the squish underfoot, and the mist was beginning to roll across the plateau like puffs of tumbleweed. Amy Rossman, for one, had already had enough of the sodden footing and was ready to move to another site. But the onset of a steady drizzle, and then an honest rain, ruled out any prospect of helicopter travel until morning.

Brewer had something that he wanted to tell me as we prepared to board the helicopter for the short ride to a different mountain camp after breakfast. "Some people have compared me to, ah, Indiana Jones," he said stiffly, "but I think of myself more as the Venezuelan Humboldt." It was a reference to the great German scientist who explored South America nearly

Smithsonian entomologist Paul Spangler squats to net butterflies in a stony stream bed.

two centuries ago. "I am a naturalist and an expedition leader in the, ah, classic sense."

The second camp sat beside one of the many blackwater streams that plunge into the great canyon that bisects the mesa. This was cloud forest, a transitional habitat between the lowland rain forest and the windswept, shrub-clogged plateau, and it looked more familiar. "There are trees I recognize here," Michael Nee said as we neared the end of the long, steep and slippery trail from the helipad to the camp. Nee was armed with a ten-foot pole with clippers on the end for snipping out-of-reach branches.

Joe Beitel and ornithologist David Willard from the Field Museum of Chicago had pitched their tents on the opposite side of the narrow, rocky stream from the main camp, only to find when they arose that morning that the water had risen two feet during the night. Both were thrilled with the finds they had already made. "This is where fern diversity is greatest," Beitel said. "There must be a hundred different species here, and several are endemic to Neblina."

Willard reported that most of the birds he had trapped in mist nets were either rare or limited to the *tepuis*. "I feel like I've come home. This is the ultimate for birds," he exulted. At midday, he loped off to ford the stream and check his 12-meter-long nets again. His haul included two thrushes, a striking chestnut-headed and yellow-breasted bird called a *tepui* brush finch, and a surprise for his birding partner John O'Neill, an ornithologist at Louisiana State University who is also a distinguished painter.

"I've got a good one," Willard sang out as he returned. "Let me guess," O'Neill replied, precipitating a rapid-fire avian version of *Twenty Questions*. "Is it passerine?" "Yes." "Do we have it yet?" "No." "A warbler?" "No." "Tanager?" "No." "But in that size range?" "Yes." "Did Phelps get it?" "Yes." "*Diglossa*?" "No, better than that." O'Neill subsided. "I give up," he said. The bird was a rare flutist wren, a *tepui* species notable for its clear and melodic call. O'Neill promptly imitated the sweetly haunting song.

The birds, netted alive by the collectors, had to be killed, skinned and prepared before they could be brought back as museum specimens. O'Neill went to work with his dissecting tools on a slat-topped, vine-secured table the Indian camp crew had custom-built for him in about ten minutes.

When rain interrupted the afternoon's collecting, the scientists gathered under a plastic sheet stretched over several poles and talked about the implications of their finds. "We can't quite call this an evolutionary laboratory yet," Willard said. "There's no doubt Neblina is an island, ecologically, but it's too early to say what it tells us about evolution." Beitel agreed. "What amazes me," he said, "is that here we are, trying to make sense out of all this, and our camp is just a pinpoint on this mountain. It's so huge there could be a million things out there."

The next morning brought a message from Brewer inviting us to join him at a third site on the other side of the canyon. My climb up the trail to the helipad was eased somewhat by the absence of my down sleeping bag. It had disappeared in the foaming, nameless stream when a misguided attempt to lob it across had fallen short. I wondered what the anacondas and eels downstream would make of it.

The third and last mountain habitat we visited was a treeless flat cluttered with the most bizarre-

Outside her tent in a boggy area, Susanne Renner—both botanist and Smithsonian Fellow—presses plants.

looking shrubs we had yet seen, artichokelike plants that perched unsteadily atop chest-high stalks thick as a man's wrist. The terrain was somewhat drier here, and the shrubs—an endemic genus called *Neblinaria*—had the twisted, supplicating look of desert plants reaching for moisture. A tiny stream rippled through a Lilliputian forest of flowering pitcher plants and *Brocchinia* at the low end of the *Neblinaria* field; a succession of sandstone and quartzite outcroppings, welcome for their solidity in this spongy realm, ringed the high side.

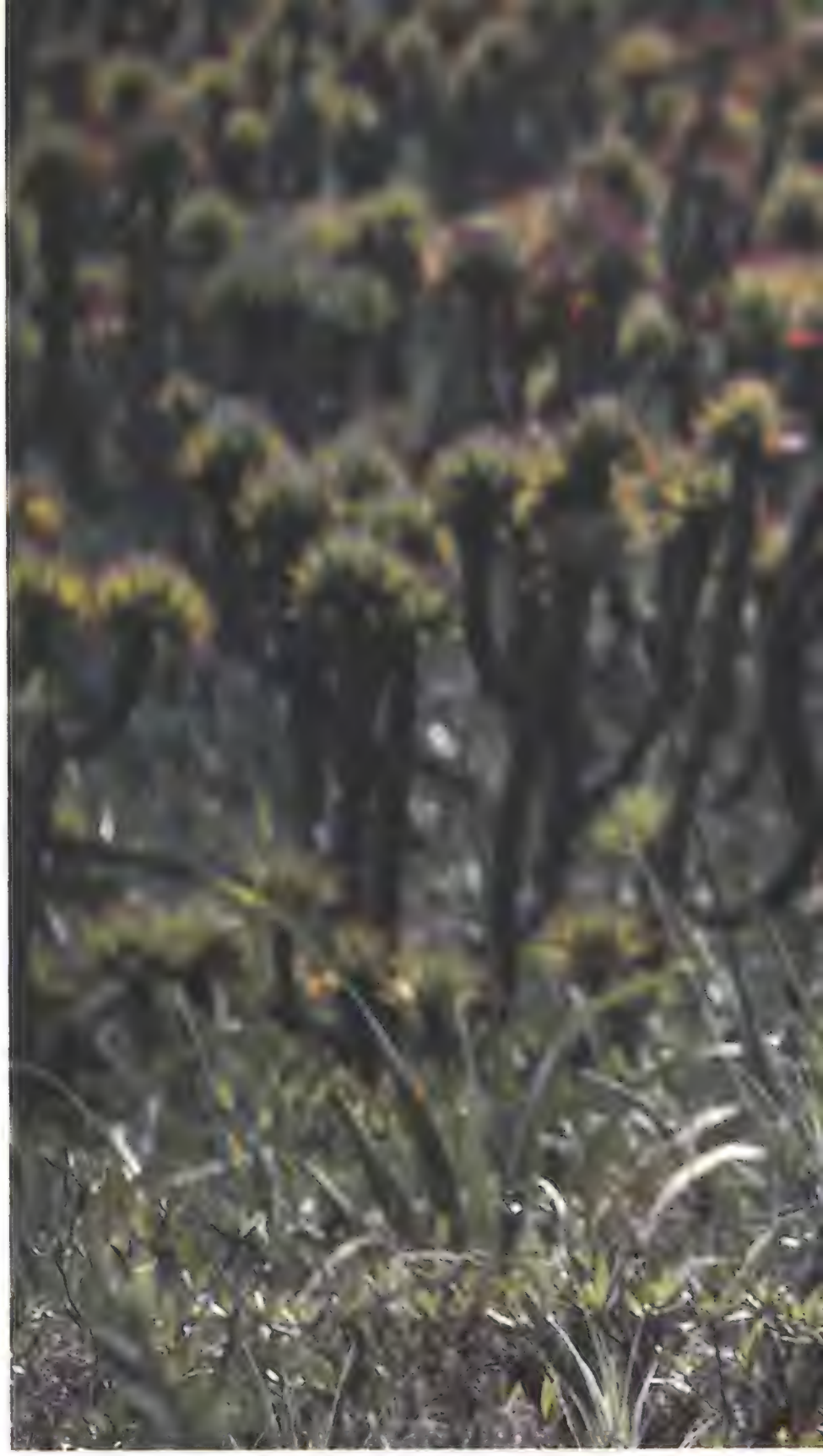
Where no man had ever walked before

Our plan was to explore and collect here until late afternoon and then helicopter back to base camp, and our party of ten was only minimally supplied with tents and freeze-dried food. The scientists scattered with their collecting bags, Brewer wandered off with his cameras and I plodded toward the rocks. The only sound I heard was my own footsteps. I suddenly realized that I was alone, and it was easy to believe that I was walking where no man had ever walked before, gazing at a vista that had remained hidden since the beginning of time. The stillness enveloped me, and on the slopes rising from the edge of the plateau I could see fingers of mist beginning to gather for the afternoon assault.

The scientists began drifting back to our pickup point as the mist thickened until it blotted out the sun. The entomologists and herpetologists had found only a few specimens of animal life, but the bountiful harvest of distinctive plants set ecologist David Benzing to thinking about their common characteristics.

"The plants are all extremely stress-tolerant," he said. "They have to deal with cool and fluctuating temperatures, high sun radiation and a sterile nutrient environment. One adaptation is the tremendous variety of carnivorous, insect-eating plants. Another adaptation is that they grow slowly and reproduce infrequently. It's a fragile system. I bet that if a bulldozer scoured a path ten meters wide here it would take a couple hundred years to regenerate," he continued.

The day's botanizing also led Harvard ecologist Thomas Givnish to speculate about the implications for students of evolution, "who want to know the pace of change and how it works. The life forms here can help us understand that only if we can establish how long the *tepuis* have been isolated and then find out what species arrived by dispersal, and those are big questions. If we can answer them, we can get a handle on genetic differentiation and the tempo of change, and learn whether there is a reliable evolutionary clock—if mutations occur at a steady rate." The ultimate lessons, he stressed, will be a long time coming.



Joy of discovery lights up face of Tom Givnish, a plant ecologist, as he brandishes his bromeliad.

In late afternoon we eyed the overcast sky, wondering whether the copter could get through to pick us up. "My ticket is for the 5 o'clock flight," botanist Bill Buck said hopefully. Entomologist George Ball suddenly reached down and picked up a large tarantula scudding toward our baggage. Ball set the spider on the sleeve of his raincoat, but regretted it almost immediately. "Seems to be a vile-tempered chap," he remarked. "He doesn't want to let go." A colleague finally scraped the tarantula off him with a knife. A few minutes later we heard the faint clatter of the helicopter engine above the clouds, but the sound soon faded. We were adrift in a lifeboat and the rescue ship couldn't find us.

He found the specimen in *Neblinaria*-studded terrain surrounding the expedition camp on plateau.

Brewer promptly scouted out a campsite, censused the available food and shelter, which was adequate, and built a fire of *Neblinaria* stalks. The survival specialist was in his element. I remembered something Roy McDiarmid had told me: "When I'm in trouble I want Charles either next to me or in front of me." The dentist-naturalist-politician expedition leader was now neither arrogant nor boastful; he was efficient, compassionate and calmly in command. Our dinner of freeze-dried soup, chili and fruit cocktail was the best we'd had in two weeks, and we slept warm and dry. The helicopter whisked us back to base camp in the morning, and the lost world faded into the mist.

The drowsy base camp ambience, with its sodden humidity and buzzing blackflies, was enlivened that afternoon by the arrival of a large military helicopter bearing a cargo of dignitaries, including the president of the Venezuelan scientific foundation sponsoring the expedition and 76-year-old Kathy Phelps, who had climbed to the top of Neblina with her husband 31 years earlier. "We came all the way in by *bongo*," Mrs. Phelps recalled. "I was always the cook, and sometimes we ate electric eels and alligator tails. The climb up took us three days, but it wasn't hard except for the final few hundred yards. On top we devoted all our time to collecting birds. At 4:30 every afternoon my husband, Billy, would look at his watch and declare happy hour, and believe me it was. We had orchids on

Group in a meadow at 7,200-foot elevation waits to board helicopter for quick hop down to scrubby forest.

our camp table and it rained constantly. Oh, it seems like it was only about 15 years ago." She looked at the mountain's massive bulk and then at Charles Brewer. "You know, you miss something going up by helicopter," she said wistfully. "Why, you practically have the Neblina Hilton here now."

Brewer seemed somewhat uneasy in the company of our visitors. He resumed his more comfortable role as mountain-survival expert the next day, when he directed a dangerous helicopter pickup of Benzing and Givnish. They had been dropped off at a remote high-elevation site and were then nearly marooned by bad weather. "I'm sure the only reason the pilot came through that overcast was because Charles was along," Benzing said later. "He had said he felt responsible for us. There's a lot more to him than I first thought."

The thinned-out contingent of scientists in camp busied themselves with their specimens. Alfred Gardner, a Paul Bunyanlike mammalogist from the USFWS said that he had collected several bats, a new arboreal mouse and a mouse opossum on top, but no larger mammals. "There seem to be gaps," he said. "We've found no deer or other ungulates and no cats of any kind. There's probably not enough there for them."

Mycologist Amy Rossman, meanwhile, who earlier had seemed to lose heart, sent a message to McDiarmid from the cloud-forest camp reporting that she was now happily adjusted. "It's gorgeous, a tropical fantasyland," she said, adding that Willard and O'Neill had netted "a tropical buff-fronted owl new to the *tepuis*. I'm not coming out," she concluded, "until there is another camp to go to."

On the following day Noonan and I boarded the helicopter a final time for the ride to a deserted strip near Santa Lucía where a chartered Cessna was to take us back to the world of telephones, credit cards and salad bars. We carried letters bearing a peculiar assortment of return addresses on the envelopes: "The Lost World, Neblina," "P.O. Box 0.5, Río Mawarinuma" and "Mountain of the Mists."

We waited four hours on the hot, dusty little red-earth strip and then gave up and took a *bongo* to San Carlos de Río Negro, where we found the pilot and learned that his plane had been delayed by engine trouble. During the long wait I asked the helicopter pilot, Leon Risquez, how long he had known Brewer. "*Cuatro años, más o menos,*" he replied. Four years, more or less. He paused a moment and then said, "*Y siempre loco.*" And always crazy. "*Loco para las montañas.*" Crazy for the mountains.

Pitcher plants and other Neblina life may eventually provide insights into the nature of evolution itself.

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Private collection

By Robert Wernick

In his tenth decade Marc Chagall's brush still danced

In a sweeping exhibition, his fiddlers play on roofs and his cows float in the sky— and he kept working until his death at 97

Philadelphia Museum of Art

Early self-portrait was done in 1914 when Chagall was detained in Russia after outbreak of World War I.

The fiddler on the roof, later to become a folk hero on Broadway and in the movies, appeared for the first time in 1908 in an early painting by a 21-year-old student in St. Petersburg named Marc Chagall. The fiddler motif was one lasting element in an extraordinary career which ended only on March 28, and which can be traced in a huge retrospective show opening May 12 at the Philadelphia Museum of Art.

Chagall went at his painting in those early days in a way that was—and with images that were—to become habitual with him throughout his long career. He started with the solid humdrum reality of Vitebsk, the town in Russia where he was born and spent his youth, with its squat timber houses lined up against a flat desolate landscape. Then he peopled the streets with house-size human figures, illogical in terms of ordinary time and space but full of a strange and unsettling vitality. One of these figures is on a rooftop, scraping away at a violin. Chagall recalled a childhood memory of a day when everyone was disturbed because Grandpa had disappeared—he was eventually found seated up on the chimney contentedly chewing some carrots. If carrots, why not a fiddle, the favorite instrument of Uncle Neuch, though he played like a shoemaker? The world in which the Chagall family lived was not expected to follow logical patterns. They were all impregnated with Hasidism, the ecstatic set of mind which had taken possession of much of east European Jewry in the late 18th century. The Hasidic world was not a machine kept going by rational causes and effects, it was a series of passionate impulses. "Behind every blade of grass," they used to say, "stands an angel urging it on: Grow! Grow!" In such a world it was only normal to find fiddlers on roofs, for cows to float over the land, for an angel to enter the bare room of Marc Chagall when he was a penniless art student and fill it with celestial light.

The Jewish communities, hundreds of miserable little villages scattered over the plains of Poland and Russia, cut off from their neighbors by differences of language, religion, dress and manners, had lived for centuries outside history in almost total isolation from the events and ideas of the outer world. But as the 20th century dawned, the old isolation was breaking down. Chagall's native town of Vitebsk was not a village but a thriving city of 50,000 or so souls, progressive enough to have an art school, wealthy enough to support the three jewelry shops owned by the father of Bella Rosenfeld, his first love and later his bride. "Her father treated himself to grapes as mine did to onions," Chagall noted.

His father was a poor man, he worked in a herring warehouse, but he struggled to educate his eight children. Young Marc learned Russian as well as Yiddish, he visited the onion-domed churches as well as the

Flowers and lovers can be a cliché. With Chagall, as in *Lovers in the Lilacs*, the theme is enchanting.

Solomon R. Guggenheim Museum, New York

Chagall's fiddlers on roofs have become world figures. He painted dreamlike *Green Violinist* in 1923-24.

synagogues of Vitebsk, and he was deeply moved by the icons on their walls with their fierce, barbaric colors, their compartmented scenes with their powerfully expressive distorted figures defying all order of time and space. Even in this provincial backwater he and his young friends were aware of the new movements stirring the traditional worlds of politics and the arts to their depths. He was already free enough from his heritage to start drawing the human figure, in defiance of Orthodox dogma which held this to be a breach of the Second Commandment. He even painted one of his girl friends in the nude, but his mother threw a fit over it. "Get that hussy out of my sight," she said, and he painted a funeral procession over the naked human body.

In the long run, Vitebsk was stifling to a young man bursting with energies and world-shaking ambitions. Even St. Petersburg was stifling, though he spent several creative years there studying and coming into contact with the most active artistic minds of the day at a time when Russia was seething with brand-new, half-weird, half-wonderful artistic ideas. To live in St. Petersburg at all—the capital of Holy Russia was off limits to a Jew from Vitebsk—he had to pretend to be a footman in the household of one of the wealthy patrons who befriended him.

In 1910 another patron offered him a generous sum of money to go abroad to the West and pursue his career there. The patron was thinking of Rome, but to Chagall as to any aspiring young artist of the time, "the sun of Art then shone only on Paris." He wrote later, "each from his corner, we dragged ourselves to Paris. Not to make a career: at that time there was little hope of succeeding. But in order to be able to express ourselves, differently, entirely, and above all to find plastic means to externalize what we felt."

Life in a buzzing beehive

Paris meant living in a building called the Beehive, a cluster of studios near the slaughterhouses thronged with hot-blooded, hotheaded young men from all over France and Europe, young men with names like Léger, Archipenko, Modigliani, Soutine—later to be the luminaries of the Ecole de Paris. "While an insulted model sobbed in the Russian studios, from the Italian ones rose songs . . . from the Jews' arguments; I was alone in my studio with my oil lamp."

The poets and painters of Montparnasse took to this ebullient young foreigner with his "curiously bright eyes and curly hair." They barely had enough money to eat, but they were ready to rearrange the canons of art. Some of Chagall's most famous pictures were painted in the Beehive on tablecloths or even his nightshirts because he couldn't afford to buy canvas.

Philadelphia Museum of Art

Museum of Modern Art, New York

A gift of flowers from his first wife, Bella, was the inspiration for *The Birthday*, painted in 1915.

This is one of several versions of *I and the Village*, an evocation of Russian rural life.

Paris in 1910 was still in the heyday of the cultural revolution that created modern art. Picasso was someone you met and argued with in a café. You did not go to a museum to see the Cézannes, they were in the gallery of Ambroise Vollard, and the raggedy young Chagall was too much in awe of M. Vollard to go in—he only pressed his nose against the window to see the unframed paintings on a wall in the rear.

He called Paris "*mon second Vitebsk*." He began to put bits of it, like the Eiffel Tower, into his paintings, but "my familiar sources remained the same": his themes were still Russian streets, Russian barnyards, Russian lovers. "There is not a centimeter of my works that does not express nostalgia for my native land . . . I did not become a Parisian."

What Paris did was give him a new way of seeing and expressing his familiar material; it flooded him with what he called *lumière-liberté*, a liberating light. "In Russia my pictures were without light. Everything in Russia is dark, brown, gray. Arriving in France, I was struck by the iridescence of color, the play of lights, and I found what I had been blindly seeking, that refinement of the . . . wanton color."

Paris was full of schools, movements; every year brought its own new ism. Chagall was in the thick of it all. He borrowed ideas right and left, but he never gave up his independence, he would belong to no group. He could flatten out his shapes like the Cubists, he could give free rein to color like the Fauves, he could twist his figures painfully like the Expressionists, he could bathe incongruous figures in a dreamlike atmosphere long before anyone had thought of the word Surrealism. But he always remained his own man, distrustful of theories and rigid categories. He was willing to fill his work with symbols, but he had little use for people putting labels on them. "I have slept very well without Freud," he said.

In these early Paris years he developed what was to be a characteristic form of his, a kind of whirligig. In one of the best-known paintings of this period, *I and the Village* (he used to let the titles for his works be plucked out of the air by his friend the poet Blaise Cendrars), there is an upthrust of energy at the bottom center—it might be the tree of life. Spinning off around it is a circling pattern of bright disparate scenes, figures, shapes—a green Russian head, and a white cow's head with beads around the neck, and the houses and churches of Vitebsk, and an upside-down woman and a man with scythe who may or may not be the Grim Reaper, and a milkmaid milking, and the sun and the moon and patches of pure color. It is "a balance of plastic and psychical contrasts," in the artist's words, "piercing the eye of the spectator by new and unusual conceptions."

Robert Wernick wrote about the Boston Latin School in last month's issue, on King Richard III in the March issue, on painter Henri Rousseau in February.

Collection of the artist

Turmoil and confusion, a landscape of uncertainty, and a contemplative Orthodox Jewish figure centered in the spectacle characterize Chagall's survey of the shocking event, *The Revolution*, painted in 1937.

There was nothing quite like this being done in Paris or anywhere else at that time. Indeed, Chagall felt a certain distance from French art, however much he loved and admired Delacroix and Manet. It was too concerned with surface appearance and not those spiritual depths he was determined to plumb. When the Impressionists broke down objects into patches of pure color, when the Cubists wrenched three dimensions into two, they were only creating new forms of the old tradition of reproducing the reality that we see under our noses. But Chagall wanted to fill his canvases with "objects and figures treated as forms—sonorous forms—passionate forms designed to add a new dimension which neither the geometry of the Cubists nor the patches of the Impressionists can achieve . . . I had the impression that we were still wandering over the surface of the paint, that we were afraid to plunge into chaos, to smash and overturn the customary surface under our feet."

In plunging into that chaos, Chagall sometimes—especially when his prose style takes off like Lady Chatterley loose in a flower shop—suggests that he worked with a childlike spontaneity. That is only a small part of the truth.

Bella Chagall has written the story of how she came to his house one day when they were engaged, bringing a bouquet of flowers. He wouldn't let her put the flowers in a vase. "Stay where you are. Don't move," he commanded, and rummaged around for a canvas to put on his easel. With great lyrical strokes he began building up the figure of his beloved in a swoop of brown, white and blue, and then added himself flying

up over and around her in his green shirt, twisting himself into an impossible curve out of sheer exuberance. In a couple of hours he had painted the hymn to love known as *The Birthday* (p. 69).

It is a charming story and may well be a true one. But the existence of a squared-off pencil sketch with figures in just this pose, though against a somewhat different background, leads one to assume that Chagall had carefully thought through his composition before Bella ever walked through his door, and was perfectly aware of what he was doing.

Underneath all the nostalgia for Vitebsk and its green cows, the folklore, the heavings and seethings of the village soul, Chagall always maintained a firm French sense of order, balance, harmony. The wild flowers of his imagination grew in beds as strictly plotted as the gardens of Versailles. The sight of a milkmaid's head flown completely off her shoulders in one of his paintings may look like a stroke of unbridled fancy, and certainly has a strong psychic effect on the spectators, but the artist insisted that he did it "because I needed an empty space right at that spot" in the composition, just where her neck begins.

Stuck fast in Russia

By 1914 Marc Chagall was a well-known Paris artist though he had never had a one-man show; only Matisse and Bonnard had them in those days, he says. Then an admirer arranged for a major show of his work in Berlin. Having got that far, he continued home to Vitebsk for a brief visit and found himself stuck in Russia for the next nine years. They were not idle years. He married Bella. He produced a considerable number of paintings and stage designs. He greeted the Revolution as a great liberation of the human spirit and was appointed Commissar of the Arts at Vitebsk. Years later he painted a picture called *The Revolution* in which he summarized his dreams in the figure of Lenin standing upside down, balanced on one hand, his limbs outstretched like an acrobat turning all the laws of society and nature topsy-turvy in the name of a higher freedom (left). Utopian dreams did not take long to run up against harsh revolutionary realities. Chagall wanted to "transform ordinary houses into museums and the simple inhabitant into a creator." For the first anniversary of the Revolution he had the streets of Vitebsk hung with nine miles of red bunting. He set all the house painters to work transferring his sketches onto large canvases to be posted throughout the streets. "On October 25, all over town, my multicolored beasts were swaying in the wind, swollen with revolution. . . . The Communist leaders seemed less satisfied. Why is the cow green and why is the horse flying in the air? Why? What does that have to do with Marx and Lenin?"

At the art school he had founded in Vitebsk he was challenged and derided as a sentimentalist by the rigid formalist followers of the Suprematist Malevich. Chagall left for Moscow, where he worked on stage settings for the experimental theaters which were then encouraged by the regime. He was glad to get a chance to arrange a show in Kaunas in Lithuania, and then go to Berlin and back to Paris in 1923.

He arrived to find he was famous. Ambroise Vollard, whose gallery he had not dared to penetrate in the old days, wanted him to do illustrations for lavish books. People wanted to buy his paintings. New groups like the Surrealists wanted him to join. The prices of his paintings began to rise, and under shrewd management—Chagall may have been naive in ways,

Collection of the artis

Portrait of Vava, whom he married after his wife Bella died, is a vivid statement, surrounded by symbols.

Private collection

Cow with Parasol, 1946, carries a bouquet, has a tail which becomes a bride, levitates above a village.

but not when it came to dealing with dealers and patrons—they have not ceased going up for 60 years.

These 60 years were in large part devoid of dramatic incident. He lived comfortably, mostly in France, and worked steadily. His happy marriage to Bella lasted till 1944, when she died unexpectedly of a viral infection. A second happy marriage, to Valentina (Vava), began in 1952. He traveled widely, from Mexico to Israel. He went to New York in 1941 to escape the Nazis, who had already burned his paintings in Germany. He would not go to America till he had received assurances that cows and trees were there, but he came to appreciate its immense spaces and the free-flowing pace of its life. But he could hardly wait to get back to France—he had been a French citizen since 1937—once the war was over.

"Rembrandt loves me"

His works over these years have made him perhaps the most popular painter of the century. His prodigious output of lithographs has brought his exploding flowers and levitating lovers into living rooms all over the world. The childlike zest of his drawing, the sophisticated richness of his color patterns, his tragicomic groupings of incongruous objects and his ever-leaping fantasy have all endeared him to a vast public. He loved vast publics; he wanted to reach out and speak to everyone, like Rembrandt. "I'm certain Rembrandt loves me," he said.

This popularity has not sat well with critics of the more rigorous schools. The two most damaging adjectives they can use about a modern painter are "decorative" and "anecdotal," and Chagall can be found guilty on both counts. His work is richly, lushly decorative. And it almost always tells a story, even though the exact point of the story is rarely clear. Why does the blue-faced cow (left) have such a smug look in her eye as she prances with a parasol in her left-front hoof over Vitebsk and a blazing cock, under a blazing sun? How has the bride with her endless white train escaped from the canvas where a green-faced Chagall has been painting her under the blazing branches of the tree of life?

The bizarre charm of paintings like these can be overwhelming at times. But as the Philadelphia show richly demonstrates, there is much more to Chagall than charm. The image that he helped create of himself as a kind of elderly elf spreading visions of cockeyed good cheer leaves out years of serious and heroic efforts to extend the boundaries of his art.

His book illustrations, of Gogol's *Dead Souls*, of La Fontaine's *Fables*, of the *Decameron*, of the Bible, are among the most innovative and evocative of recent times. There was much muttering in France when Vollard chose a foreigner to illustrate La Fontaine, the most purely French of the French classics. But Vollard insisted that writer and artist were brothers under the skin, "sound and delicate, realistic and fantastic."

A distinguished career in stage design got a new beginning when Chagall was commissioned to do the sets for a ballet, *Aleko*, based on a poem of Pushkin's, with music by Tchaikovsky, choreographed by Léonide Massine—Russians all. Chagall threw himself into

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the work with a super-Russian pattern and the results were literally overwhelming, communicating Pushkin's romantic-tragic tale so forcefully that the dancers seemed like interlopers in front of the sets. "So exciting are they in their own right," said the *New York Times* dance critic John Martin, "that more than once one wished all those people would quit getting in front of them."

The backdrop for Scene III of *Aleko*, "A Wheatfield on a Summer's Afternoon," shows a grainfield under a bright sun to the left and Aleko and his love, the gypsy Zemphira, in a boat under a harvest moon to the right —an intense expanse of yellow (below) that might have been inspired by the trip the artist had just taken across the great spaces of the United States to Mexico, where the ballet was first performed. Color of this intensity, on this scale, was unheard-of in 1942. "I want the color to play and speak alone," said Chagall.

Sets like these for *Aleko* and for a later production of Stravinsky's *The Firebird* helped kindle a taste for the monumental in Chagall. He did the new ceiling for the Paris Opéra at the request of André Malraux, President de Gaulle's Minister of Culture. Again there was considerable opposition: no one knew how the work of the most flowery of 20th-century painters would fit into the most florid of 19th-century architectural masterpieces. "I wanted to reflect, as in a mirror, the clustered dreams, the creations of the actors and musicians, and to keep in mind that down below the colors of the clothing of the audience were moving about. To sing like a bird, without theory or method." To the surprise of everyone except Malraux and Vava Chagall, it sings quite well, all the lovers and angels and the flying fiddle and the Eiffel Tower and the Place Vendôme in a kaleidoscope of warm colors.

There were other monumental commissions. He did giant murals for the new Metropolitan Opera House in New York. He did a series of giant paintings on Biblical themes which occupy a whole museum of their own in Nice.

In the 1950s, when he was past 70, he opened a whole new career as creator of stained-glass windows and helped revitalize an art form that had been moribund since the Middle Ages. He designed windows that fit

Museum of Modern Art, New York

"A Wheatfield on a Summer's Afternoon," a setting for the ballet *Aleko*, 1942, reflects the artist's belief that the theater should be a place of marvels; poetic, free in form, a place for upside-down trees to grow.

His tour of duty was over. This was his final good-bye. He remembered all the good times, the joking and that special closeness that comes from sharing not only victory, but defeat.

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into the 14th-century Gothic traceries of the cathedral in Metz, and windows that stand alone in the bare walls of a hospital synagogue in Jerusalem. Unlike most modern designers of stained glass, but like the medieval craftsmen of the great cathedrals, he was less interested in flat color patterns than in the dramatic surge of light through the window. In collaboration with Charles Marq, the master glassmaker of Rheims, he worked out new techniques of varying the intensity of the color within a single pane of glass. The themes are always religious—angels, prophets, the Tribes of Israel—the mood is partly reverent and partly ecstatic. It is also fanciful and sometimes mischievous, as was the work of his medieval predecessors. He was delighted to find a green donkey such as he might have painted tucked away in a high medallion window in the ambulatory at Chartres.

Chagall also did tapestries and ceramics and sculpture. And through it all he went on turning out the kind of painting that made him famous: fanciful figures in a world more and more dominated by color, color which he wanted to be "as penetrating as when one walks on a thick carpet." In 1984 at the age of 97 he was painting pictures like *The Dream* (opposite) in which familiar images from the past—lovers and angels and flowers and a horse cart in the street—seem to float out of a bath of pure color.

He would have been 98 in July. For the first time in his life he was not up to attending the opening of one of his shows. He was the last survivor of the generation of giants who caroused and created in pre-World War I Paris. He had seen others die after a dissolute youth, like Modigliani, or live on to a cranky old age, like Picasso. He went tranquilly on in his quiet rambling house near St. Paul-de-Vence in the South of France, laden with awards and medals and honorary degrees, calling fresh images out of his past. He paid a visit to Russia in 1973 at the invitation of the Soviet government, which brought his paintings out of the basement for the occasion. He painted a picture of himself as the prodigal son returning to a land in which nothing had changed since his youth. He obstinately refused to be taken back to Vitebsk, destroyed during the war and rebuilt in the faceless soulless contemporary style. "I would have been too afraid not to recognize my town," he said, "and in any case I have carried it forever after in my heart."

In his 70s Chagall turned to stained glass. *The Dream of Jacob* was a trial window for the Metz cathedral.

With imagination and technique as fresh as ever, Chagall painted *The Dream* last year, when he was 97.

Collection of the artist

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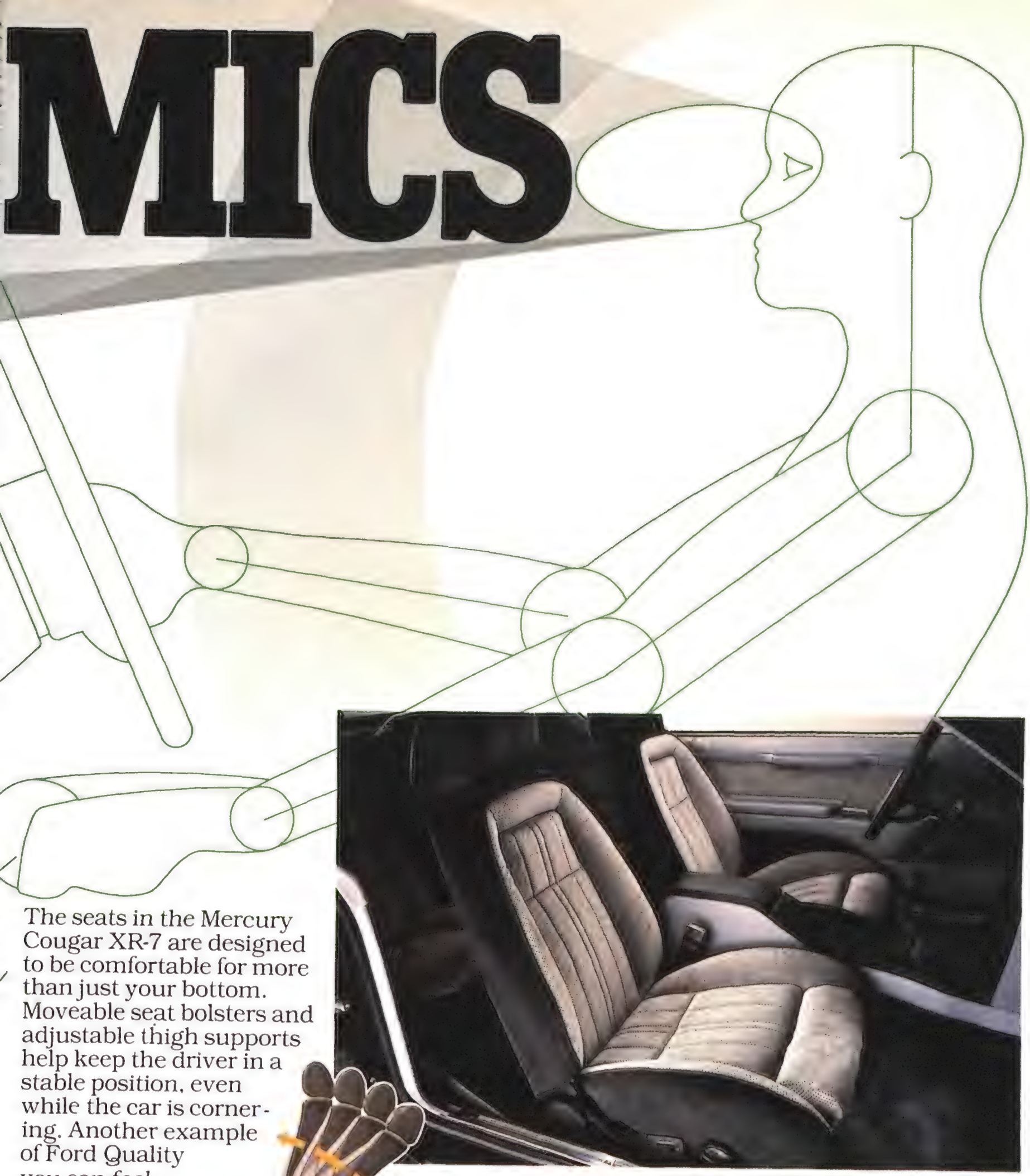

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High schools that work: second of a series

By Richard Wolkomir

The winning equation at 'P.S. IQ': bright kids, good teachers, hard work

Bronx High School of Science has produced three Nobel laureates and more Westinghouse Talent Search winners than any U.S. school

F SCIENCE

In a classroom at the Bronx High School of Science, in New York City, a dark-haired 16-year-old named Danny Pelty shoots up his hand. He points a finger for emphasis.

"Cemeteries are running out of space, right?"

His classmates eye him quizzically. They have been debating the need for new energy technologies, not the logistics of urban interment. But at the Bronx High School of Science, where the criterion for admission is an active mind, you never know where a class discussion might wander.

"Okay, I don't want to sound barbaric," says Danny, brown eyes intense. "But—after we all die—why not use our *bodies* as biomass, for *fuel*?"

There are no hoots. No titters. No jeers, giggles, taunts or groans. No outraged sighs. Only a long contemplative silence. "You'd have a public-relations problem," a black girl with a spiky punk-rocker hairdo finally says. A boy named Wing Son Woong announces: "Bodies would generate insufficient biomass to make it economically feasible."

Thinking, no matter how outré, earns peer respect among the 3,200 students at this exceptional public high school. Of 7,000 youths who apply each year, only about 900 pass the one-and-a-half-hour admissions exam. Some of Bronx Science's old grads jokingly dub their alma mater "P.S. IQ." Results are spectacular.

Since its founding in 1938, Bronx Science has produced three Nobel Prize winners in physics—Leon Cooper in 1972, Sheldon Glashow and Steven Weinberg in 1979—and a long roster of distinguished engineers and scientists such as the MIT expert on artificial intelligence, Marvin Minsky. But Bronx Science also has produced two generals and a U.S. Secretary of Defense, Harold Brown. Black militant leader Stokely Carmichael is a Bronx Science graduate. So are many successful journalists like *New York Times* columnist William Safire. The school's achievers are as diverse as *Ragtime* author E. L. Doctorow and the late singer-composer Bobby Darin, who graduated as Walden Cassotto.

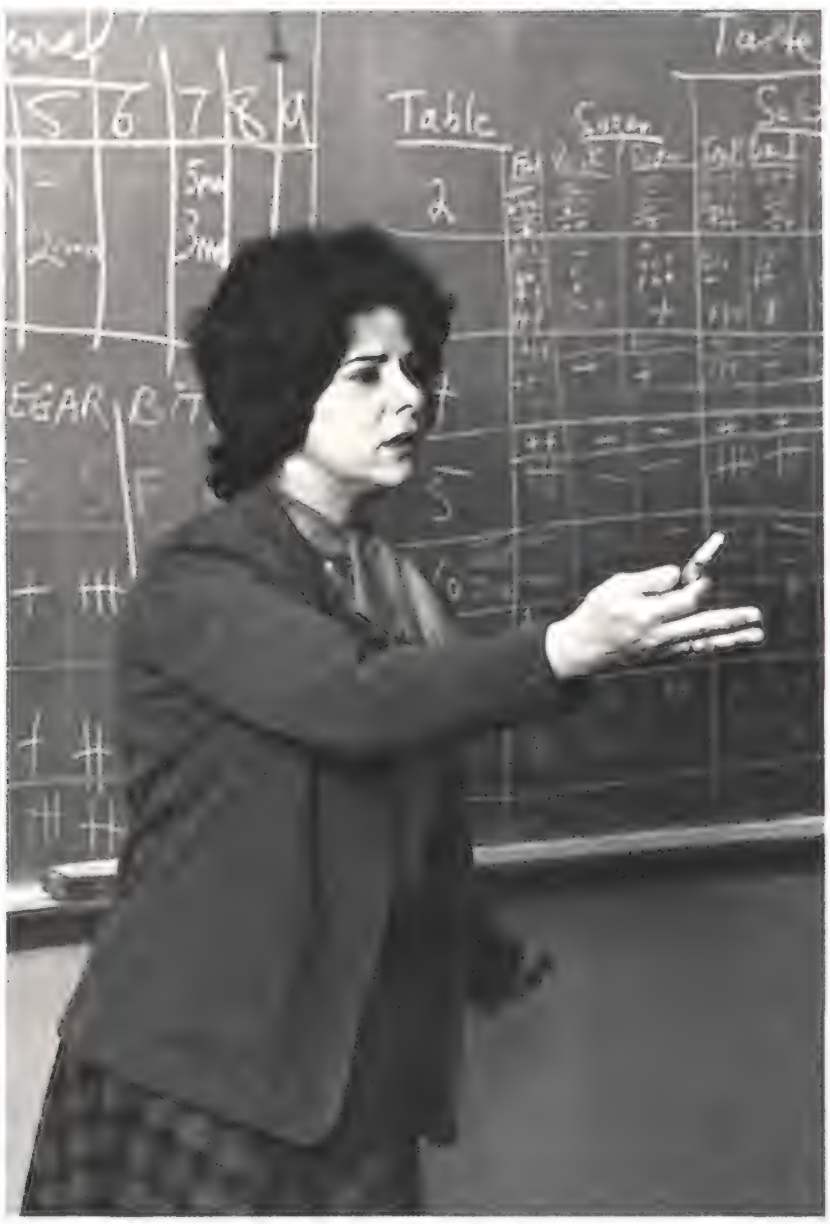
In the Westinghouse Science Talent Search contest, in which student research is judged by professional scientists, Bronx Science has produced more winners over the years (95, at last count) than any other school in the country, roughly twice as many as school number two. Annually, Bronx Science's graduating seniors are offered about two million dollars in financial aid for their first year in college, and virtually all go on

John Kuo won fifth place and a $7,500 scholarship in Westinghouse Science Talent Search. Celebrating in back are students who won honorable mention.

Photographs by John McGrail

Acting department head Joseph Scavone makes point about James Joyce's *Dubliners* in senior English class.

He was awarded an honorary doctorate by Georgetown University for excellence in high school teaching.



In a biology class, Ellen Berman leads a discussion of which parts of the tongue sense sugar and salt.

to colleges and universities. As a Carnegie Foundation for the Advancement of Teaching study put it, this "is a public school that works."

To find out *what* it is that works—in this era of worry over declining U.S. leadership in science and technology—educators from across the country and as far off as New Zealand, Japan and Turkey trek to the Bronx. The secret, they learn, is a rigorous program that energizes students, who then inspire their teachers and each other: synergy.

"It's not really that our kids are so especially smart," says Bronx Science's cigar-puffing principal, Milton Kopelman, who—like almost everyone at the school—talks at high velocity. "There are schools in high-income suburbs where the students have the same intelligence level as our kids, and economic advantages most of our kids could only dream about."

About a quarter of Bronx Science's students come from low-income families, many living in the city's grimmer slums. Nor are its facilities lavish—it boasts only two greenhouses, an inoperative planetarium, computer rooms and some specialized labs.

"What's special here is that the kids *choose* to be at this school," says Kopelman. "And the diversity of these kids is fabulous—they're from up and down the economic scale and from every religion, race and ethnic background you can imagine."

The author, who recently won a writing award from the American Association for the Advancement of Science, reported last January on outdoor chic.

Himself a graduate of the school, Stephen Schonberg directs Kim Fitzgerald in the reading of a one-act play.

The school has no drama club but does do a senior show; this year it is Neil Simon's *The Good Doctor.*

Discipline is rarely a problem, Kopelman continues. "When kids are having emotional problems, the way it shows up is usually through cutting classes and underachievement." He can remember only two or three instances of students acting "fresh" to teachers. Any student caught being involved in drugs is automatically suspended, but this does not appear to be a problem either, although it was in the 1960s and '70s. Students say that classmates do experiment with drugs, but probably no more so than elsewhere.

Min Jin Lee, a Bronx Science junior, who immigrated to New York from Korea when she was seven, is typical of many of the school's students in at least one way: she must leave for school at dawn.

Min Jin, an ebullient girl whose blunt-cut hair bounces as she talks, lives in a house on the city's far side, in the borough of Queens, where her parents own a wholesale jewelry store. Her journey to school requires two subway transfers, and two hours have passed in the rattling, graffiti-covered cars by the time Min Jin exits from the "D" train at the Bedford Park Boulevard station, emerging onto the Grand Concourse. Jauntily swinging a blue backpack, she hurries with other students past rows of nondescript apartment buildings, under the Jerome Avenue El, past a subway yard and into the sprawl of white and red bricks that is the Bronx High School of Science.

"It sounds sort of elitist, but here you meet better people, and they respect you if you know extra things. I went to a private school in Connecticut last summer where, if you knew something, those kids at first would

In an honors class for juniors, Ruth Cohen helps Jin Young Lee determine a vapor's molecular mass.

One group has designed robotic unit to drill holes in circuit boards for use in sound-and-light devices.

categorize you as a 'brain,' " she says. "Here you read a book just because you want to. I'd send my kids here."

Like some of Bronx Science's students, Min Jin has no special interest in science. "In fact, I used to hate math—my sisters are math whizzes—but I'm having an easier time with higher math now, probably because of the teachers," she says. "Science is pushed here more than liberal arts, of course, but our liberal arts classes are advanced compared with ordinary schools." She plans a career in corporate law and business; she hopes to go to Yale, followed by Harvard Law School. She does not regret the school's emphasis on science: "After all, I might be president of a chemical company someday," she adds.

Students at most U.S. high schools would find Min Jin's daily schedule daunting. According to a Census Bureau sample survey, the average American high school student spends just seven hours a week on homework. "I do at least three or four hours of homework an evening," says Min Jin. "And then there are term papers, special projects, speeches and reports." She also spends time with the school's community service club and the Korean club. "We have about ten different ethnic clubs, but Italian kids join the Jewish club, and Polish kids join the Indian club—at this school we don't have any cliques."

Min Jin also works on one of the school's dozen publications, journals in fields from French to physics, where students can publish their original research results. A recent issue of the school's *Journal of Biology* contained such catchy titles as "A Comparison of Fatty Acid Metabolism in Bovine Liver Mitochondria to That in Rat Liver Mitochondria" by Ling P. Chen, "The Clotting Process" by Esther Melinda Mahabee and "Chemical Modification of the Fatty Acid Oxidization Complys in *Escherichia coli*" by Maria Bilelis. For the social studies journal, Min Jin is working on a paper about the role of children in war. "Did you know that some of the people fighting in El Salvador are under age 16?" she asks.

She leaves school around four each day, her blue backpack stuffed with books and notes (p. 89), and arrives home ready for a long evening of scholarship. At midnight or 1 in the morning, while the rest of her family sleep, Min Jin is still at her desk, sometimes dialing her friends—also awake and studying—to thrash out knotty problems in chemistry. She sleeps only four to six hours a night. "But sometimes, to make up, I sleep for 20 hours straight," she says cheerfully.

Milton Kopelman sits in his large office, surrounded by the metal forest of trophies Bronx Science students have won in everything from tennis to interschool physics duels (p. 88), his plastic-tipped cigar sending up puffs of smoke that signal "No!" He has been asked, for the nth time, if Bronx Science is a pressure cooker.

"That's the myth," he says. "The reality is that no teacher here ever says to a student, 'Hey, how come you only got a 90?' True, a lot of kids here feel pressure to

From the left are Danny Preston, Dean Giotopoulos, Michael Arkin, David Schmidt and Tommy Taylor.

At an honor society induction ceremony, senior Larry Rudman lights the candle representing scholarship.

get high grades, to get into the best universities, but that competitive push comes from their families and from themselves, not from the school."

Only 12 to 20 students leave the school each year because of difficulties in meeting the demands. Of the annual total of 50 to 100 who leave, most do so because their families move away or they find that the commuting is too much for them.

While he is on the subject, Kopelman puffs away another myth: elitism. "The truth is that Bronx Science, if anything, is anti-elitist," he says. "Kids come here from feeder schools where they were big fish in little ponds, and they find that there are plenty of other kids—*lots* of them—who are smarter than they are, which is a kind of humbling experience."

Humbled or not, apparently students do succumb to an occasional twinge of specialness: "Most kids here will tell someone they go to Bronx Science and then wait for applause," says Min Jin Lee. But they have little time to gloat. They must plow through four years of stiff courses in English, social studies and science,

In a relaxed moment after classes, junior Pat Crowe, left, and senior Cora Henderson take time to chat.

In a basic chemistry class, students work under kindly gaze of one of the giants of 20th-century science.

and three years of no-holds-barred mathematics. They also must take two one-year electives such as probability and statistics, microbiology, human genetics and evolution, astrophysics and laser optics.

Also required are courses in drafting (including computer-aided design), music, art, health, physical education and computer literacy. In shop, for a change of pace, students make telescopes and flutes. They also must take at least three years of a language: Spanish, French, Russian, Italian, Latin, modern Greek, Japanese or Chinese.

Meanwhile, students are encouraged to take college-level courses in everything from writing and European history to sociology and astrophysics. And they can nibble from a smorgasbord of "enrichment" courses like journalism, Asian history or oceanography. About a quarter of the students get really serious: they enroll in the "research track," spending their sophomore and junior years learning scientific experimentation methods and conducting full-scale experiments of their own design, often using laboratory facilities at hospitals, colleges and universities around the city. It is these projects that have produced so many Westinghouse contest winners.

"The main thing here is the Socratic method—we don't tell students things, we ask them questions, and that goes for English as well as physics," says biology chairman Vincent Galasso.

In a nearby classroom, a peppy biology teacher named Ellen Berman (p. 82) plays Socrates as a roomful of freshmen study proteins. "What's the difference between a raw egg and a cooked egg?" Berman asks. Hands fly up. "The cooking heat changes the protein's secondary structure?" suggests a blond girl with intense blue eyes. "Why?" asks Berman. A black boy with enormous glasses: "It messes up the hydrogen bonding?" "But what about the disulfide bonds?" asks a dark-eyed girl, whose neck, wrists, fingers and ears glitter with jewelry. A tiny boy asks: "Is there a breakdown in the disulfide bonds?" "OK," says Berman, "I'll diagram this and you tell me what's happening." Thirty pairs of eyes watch intently as she draws molecules; hands are poised to shoot up for the next round of questioning.

The teachers are self-selected, too

Bronx Science teachers insist they are not superteachers. "I taught ten years in East Harlem, one of the poorest schools," says Stephen Schonberg (p. 83), who teaches drama and coordinates student activities. "I didn't come here and, overnight, get brilliant."

Yet, some of Bronx Science's 160 teachers, like Schonberg, who immigrated to the United States from Hungary at age seven, are themselves graduates of the school. Principal Milton Kopelman attended a specialized high school in Manhattan, entering college at age 15. He has been on the Bronx Science faculty for 34 years. For many teachers, in fact, the school is so attractive that faculty turnover is minimal. As one teacher puts it, "You'd have to dynamite me out."

"But a lot of teachers don't want to come here because of the extra work," says Kopelman. "Some might even be intimidated by the students. The result is a self-selection process."

Joseph Scavone (p. 82), a Manhattanite who has taught English at Bronx Science for 18 years, is one of the self-selectees. "I was teaching honors classes at another school," he says. "But I wouldn't compromise my standards by giving them the high marks the school expected. So I moved to Bronx Science, where my standards match the school's."

The school itself came under pressure in the late 1960s to lower its standards, specifically by dropping the entrance exam. Minority groups charged that the

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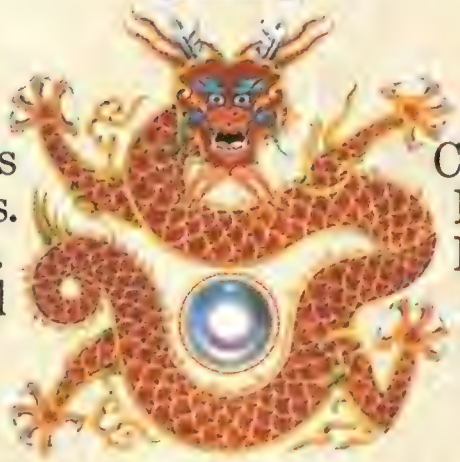

A REGISTERED TRADEMARK OF GENERAL ELECTRIC COMPANY.

Principal Milton Kopelman works amid a forest of school trophies, many of them won for debating.

test could be racially biased. The exam, now evaluated for bias, has stayed. So have the standards.

"For me, teaching would be the same at any school—I have no gimmicks, just share the literature," Scavone says. "But by the end of the year we have something." Bronx Science has produced more candidates for advanced placement in English literature (high school students attempting to earn college credit) than most other schools in the country. "We have kids who are creative enough to handle complex material, and why shouldn't we serve the needs of some of these gifted students with a special school?

"These kids do have intellectual curiosity—they *have* it!" he adds. "When those 30 minds in there spark off one another and start to go, they're infinitely better than my one mind."

It is precisely the emphasis on "mind" that is Bronx Science's secret. The school esteems thinking the way some schools honor flashy dribbling and deft tackling. Athletics are not slighted—Bronx Science offers most standard interschool sports (except football, because of the expense and the potential for injury). And the trophies crowding Milton Kopelman's office represent championships in everything from volleyball to swimming, tennis and soccer. But most of the trophies, including monstrosities as big as shrubs, were won by the debating team.

Students do have complaints, of course. "Not enough guidance counselors" is a common charge. So is "Too much emphasis on science—the liberal arts get slighted here." Students worry that college admissions officers do not realize that a Bronx Science "B" may outrank a "B" at an easier school. Many chafe because students live citywide, making for poor attendance at sports events. One student, with a typically lengthy commute, moans: "Why can't it be the *Queens* High School of Science?"

But most of the complaints are quibbles. The students are well aware that the education they receive here is superior.

Larry Rudman (p. 85), the son of a Bronx sanitation worker, is a tall, good-looking youth who might be a small Iowa town's star halfback. He has only one lament about Bronx Science: "No football team!" But he has one of the school's highest averages, and his shy brown eyes sharpen when he talks about math or physics. "It's a good feeling to think for yourself and come up with a solution that's all your own, and that's how they teach here," he says. "You can learn from the other students, too—in class discussions, I love to hear what people are saying."

"I heard about the Bronx High School of Science soon after we arrived here," says John Kuo (pp. 80-81), a senior, who moved to Queens from Taiwan when he was nine years old. His research project in genetics—"The Mechanism of Transposition of Tn5 in *E. coli*"—recently won him fifth place, a $7,500 scholarship, in the Westinghouse competition.

After playing violin with the Youth Symphony Orchestra of New York on and off since grammar school, John had to drop out because he needed the time for his research. Nevertheless, he relishes Bronx Science's rigor. "Here, teachers aren't afraid to be questioned," he says. "In chemistry, we'd stump Mrs. Cohen, but she'd pull out the apparatus and we'd all do an experiment and learn together."

As chemistry teacher Ruth Cohen (p. 83) puts it: "Kids are incredibly encouraged here—not *pushed*, encouraged, because you're not an oddball here if you want to learn, to achieve."

In her chemistry laboratory, she watches students bustle about with test tubes and beakers. A boy who resembles former heavyweight champion Joe Frazier brings her a beakerful of red goo to examine, deftly dancing his way across the jammed room, shuffling daintily around a cluster of students struggling with a recalcitrant Bunsen burner, pirouetting, pausing for a one-two count to shake his head in mock dismay at a Chinese girl's bottle of clear liquid, finally presenting his beaker to the teacher with a flourish and a bow.

"If I get depressed, I come to school and I'm happy again," says Ruth Cohen. "Because, more than anything else, these are *nice* kids."

In what might be called the middle of her day, Min Jin Lee heads home for Queens and hours of homework.

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By Allen Kurzweil

Man of many faces: a wily wizard and his time machines

Breguet, watchmaker extraordinaire, *combined horological innovation with political acumen and produced the best 19th-century timepieces*

Jean-Loup Charmet

Portrait of Abraham-Louis Breguet shows the man described in identity papers as: "Height, about five feet three inches . . . nose and mouth, average."

The dial of the desk clock confuses the observer, rimmed as it is by ten hours instead of the usual 12. With Arabic numerals and a face of simple silver, the clock records a bizarre and short-lived experiment conducted in Paris during the French Revolution. Unwilling to perpetuate the traditions of the court, the newly empowered Jacobins decided to re-create France down to the minute. They established a *nouveau système horaire* known as decimal time. By government decree, the Revolutionary day lasted 1,000 minutes spread over ten hours. Obviously, the man who made the watch had adjusted his gear ratios and politics to the standards of the Revolution.

But is it so obvious? When the clock is turned over, its underside reveals a smaller gold dial rounded by 12 Roman numerals. Like its creator, Abraham-Louis Breguet (1747-1823), the timepiece bears two faces, satisfying both the royalist and the republican.

Radical in appearance and conservative in accuracy, Breguet watches changed the face of timepieces while their owners changed the face of Europe. Whoever clung to power between 1785 and 1824—years that the novelist Stendhal considered more monumental than the previous 2,000—also clung to a Breguet pocket watch. Stendhal did. So did most of Europe's aristocracy. The mightiest nobles timed battles, hunts and amorous rendezvous to the muted chimes of a Breguet. Monsieur Breguet provided the rich with a catalog of new horological toys that ticked status. Owning one implied power, guaranteed prestige and promised precision. A Breguet meant quality.

Of the 5,000 watches logged in the Breguet books, fewer than 1,000 survive, treasured by museum curators and private collectors. Original Breguets today can cost from $3,000 to more than $100,000. A self-winding watch auctioned in 1978 brought $114,000. The horological heist of the decade offers exasperating homage to the revolutionary watchmaker. Two years ago, professional burglars broke into the L. A. Mayer Memorial Institute in Jerusalem on a weekend. Among other items, they selected nine of the finest Breguets including his chef d'oeuvre known as the "Marie Antoinette" (opposite). They have never been recovered. The previous owner, Sir David Salomons, captured the passion of all collectors when he observed: "To carry a fine Breguet watch is to feel that you have the brains of a genius in your pocket."

To this day that genius survives in literature—the Count of Monte Cristo, Phileas Fogg and Eugene Onegin regularly consult their Breguets—and in the

A rock crystal dial on Breguet's "Marie Antoinette" *perpétuelle* allows the complex mechanism to be seen.

L. A. Mayer Memorial Institute of Islamic Art, Jerusalem

Photographs by Stephen Pitkin
The Time Museum

A "revolutionary" decimal dial watch measures ten-hour day, but smaller secondary dial below keeps 12-hour time.

museums of Europe and America. William Andrewes, curator of the Time Museum in Rockford, Illinois, believes that "Breguet's work is distinguished by its unmistakable appearance, which combines his unique sense of design with the finest craftsmanship. He offered his clients a wide range of timekeepers which have remained as desirable today as they were when they were first made."

Breguet's career spanned the reigns of two Bourbon kings, the three governments of the First Republic and the rule of Napoleon Bonaparte. When one leader fell, Breguet moved shrewdly to supply the next and kept to the tempo of the age. Back and forth he traveled along the arc of the political pendulum, and with each journey enhanced his skill and enlarged his connections. In 1762, at age 15, he emigrated from his native Neuchâtel, a tiny country which later became a canton of Switzerland, to Versailles, where he fell under the benevolent gaze of Abbé Marie, the King's mathematician and tutor to the children of the Comte d'Artois. Young Breguet studied mathematics at the prestigious Collège Mazarin and learned the craft of watchmaking.

Though a watch today can represent little more than a couple of dollars' worth of circuitry and plastic, back in the 18th century the finely turned pocket watch was worth more than its weight in gold. Diderot and D'Alembert, in their successful *Encyclopédie*, appended more lithographs to the chapter on *horlogerie* than to any other field of study. Voltaire tried to create a utopian community of watchmakers in Switzerland. (Alas, his attempt failed.) Many of the *philosophes* saw in the clock a complex model of the Universe. Not Rousseau. The watchmaker's son sold his timepiece: he had no use for arbitrary divisions of hours and days.

But others did, and the demand for fine watches soared. While philosophers played with the mechanism of the state, the watchmaker played with the state of the mechanism.

Maison Breguet rose on the prow of the boat-shaped Ile de la Cité, the largest of the Seine islands in Paris. The quarter had been the hub of Parisian commerce since the third century, but by 1775, the year Breguet married into wealth and opened his workshop, it lodged the city's inventors and opticians.

Watches, however, accounted for most of the business in a quarter dominated by the Horloge du Palais, the city's oldest striking clock. The powerful continually gathered in the Breguet showroom at No. 79 Quai de l'Horloge to inspect his handiwork. Without advertising, the workshop generated a thriving business that stretched from the clipped gardens of Versailles to the exotic sultanates of the Middle East.

By the end of his career, Breguet had supplied his wares to Lords Chesterfield, Londonderry and Beauchamp. The list continued up the noble tree to the Dukes of Marlborough, York, Polignac and Praslin, and the Kings of Bavaria, Naples, Tuscany, Spain, Holland and Westphalia. Louis XVI and XVIII scheduled their lives to the beat of Breguet clocks. To these names must be added assorted Turkish dignitaries, czars, empresses and scores of lesser aristocrats. Generals gave Breguets to talented lieutenants; queens gave them to talented paramours—and often the paramours and lieutenants sold them back to Breguet who sold them again for a higher price.

His inventions made Breguet timepieces unique:

- The *tourbillon*: a device to overcome the variations in the rate of a watch when it is held in different positions; a watch lying flat on a dresser could keep time at a different rate than when hanging in a pocket.
- The *pendule sympathique*: a clock with a cradle that holds a specially designed pocket watch; the clock automatically winds and sets the watch (p.101).
- The *montre à tact*: a watch on which an exterior hour hand can be moved to tell the hour in the dark or while the watch is in the pocket. It is also called the blindman's watch (p. 98).

But Breguet did more than invent; he redesigned so that his watches looked, felt and sounded like no other. Modifying the movement invented by his contemporary, Jean-Antoine Lépine, Breguet was able to slice the thickness of the watch in half. Rivals often rimmed their watches and clocks with cherubs, Father Time wielding a scythe, and with hourglasses dripping sand. Breguet simplified. He did not wish his watches to hang like wrecking balls from the vests of his customers. The timepieces were to be slipped smoothly out of an unobtrusive pocket.

Allen Kurzweil studied original Breguet records for this article. He lives in New York City and writes on cultural and historical subjects.

Even when customers ordered watches to suit particular tastes—a Turkish dial, for example, or a double dial—Breguet sustained a personal wit in his designs. Sometimes he put the minute hand in the center to make a full sweep of the watch, and then made subsidiary dials behind it for the hour and second hands. Other times he placed internal dials on the face asymmetrically. These beauty marks gave the watch a certain inexplicable balance.

Breguet sheathed his movements in engine-turned silver and gold, placed the watches in carrying cases of Moroccan leather (tanned goatskin dyed with sumac). Inside the box, he often supplied a spare dial, glass and mainspring.

To combat forgers who recognized the popularity of his designs, the watchmaker teamed up with engraver Jean Pierre Droz to develop a so-called "secret signature" on the watch face; only by holding the watch to the light and using a magnifying glass would the cursive name appear. In addition, he registered each of his watches in ledgers which guaranteed authenticity.

These books, now locked away in a Paris vault, itemize each watch, the name of the workman and labor costs, the date of sale and the name of the purchaser. (In 1971, the Breguet company and its records were purchased by Chaumet. The company continues to produce watches in Switzerland using Breguet's good name as a symbol of excellence.) The name that appears most frequently in the first series of registers is Breguet's best-known pre-Revolutionary client, Marie Antoinette. The Queen's infatuation surely secured Breguet's commercial growth, but so did the sheer ingenuity of the first watch he sold her. The watch wound itself automatically; he called his variation of this invention a *perpétuelle*. Sales records indicate that demand jumped significantly following the purchase.

Marie Antoinette bought six, offering them as gifts. She gave one to her husband, Louis XVI, and one to her supposed lover, the dashing Swede, Count Axel Fersen. So passionate about Breguet's work was the Queen that even while in prison she ordered a watch, listed as No. 179. But the finest example of Breguet's ingenuity, the "Marie Antoinette," was never seen by the Queen. Breguet craftsmen only completed the timepiece in 1823, 30 years after its namesake's death and 40 years after the order had been placed by an officer of the Queen's guard with the condition that "all the complications possible" and known at the

Three watches show Breguet's range of complexity. From left, quarter-hour repeating, cheaper single-hand *souscription* and an elegant four-minute *tourbillon*.

Smithsonian Institution

Smithsonian Secretary Samuel P. Langley bought this Breguet on a European collecting trip. It contains specialized suspension for absorbing shock.

Breguet produced a variety of mechanisms including this gold carriage clock (left), the watch-shaped Fahrenheit thermometer and the boxed chronometer.

time would be incorporated into it. Where feasible, gold and platinum replaced the conventional brass, and limitations of a completion date and price were never imposed.

In 1789, on the eve of the Revolution, Breguet traveled to England both to catch up on London watch innovations and to demand payment from the Duke of York. Unable to collect from the Duke—the ledgers to this day indicate accounts due—Breguet turned his attentions, profitably, to the Prince Regent, the future George IV. He also strengthened his ties with England's top watchmaker, John Arnold. In his store on The Strand, Arnold allowed Breguet to dissect the Londoner's bulkier but highly accurate watches. Inspired, Breguet returned to Paris and produced a ratchet key that protected a watch from being wound backward; time could only move ahead. It was a fitting tribute to a tumultuous year.

Though of less-than-radical sentiment, Breguet was no fool. He realized that his court connections were dangerous for him under the Jacobin rule. To counteract his royalist image, he joined the Revolutionary guard, first signing up with the *compagnie pot de fer* and then the Sans-culottes. From 1789 to 1792 he straddled the two worlds, by affiliating himself with a man who sold politics as shrewdly as Breguet sold watches: the impious Bishop of Autun, the ever-changing Talleyrand.

Two salesmen stage a demonstration

The two were matched perfectly. On April 10, 1792, Talleyrand signed a promissory note for an unspecified number of Breguet watches. He was most likely a supersalesman, carrying about exquisite timepieces while in the presence of potential buyers. In a famous incident the two men staged a demonstration to show off the durability of a new innovation. Breguet stood up at a dinner table and tossed his watch onto the floor. When it was picked up, those present were shown that it continued ticking, and Talleyrand exclaimed: "That devil Breguet is always trying to go one better." One better in this case was a parachute suspension, a shock absorber in the movement. Breguet soon fitted this protection onto most of his watches.

One of the earliest objects purchased for the timekeeping collections of the Smithsonian Institution was a Breguet containing this device. Recognizing the watchmaker as one of the eminent horologists of all time, Secretary Samuel P. Langley purchased the watch (p. 95) in 1890 for £5 during one of his European collecting trips.

Ingenuity, however, could not protect Breguet from the political shocks surrounding his clients. By the end of 1792, he was drawing suspicious glances from those

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Breguet's thin watches were designed to be carried unobtrusively in a man's pocket. The slim, gold *garde-temps* (left) contrasts sharply with the heftier pocket chronometer by Englishman John Arnold.

in power. He took precautions and sent his son off to England.

The situation worsened and the fervor of the government increased. So did the bloodshed. "Leave the cursed Jacobin," wrote Breguet's son on August 20, 1792, from Arnold's London shop. Breguet needed no admonition. Ten days before the letter was inked, sanded and posted, his patroness, Marie Antoinette, had been jailed. Sensing the impending crisis, he contacted his friend and fellow Swiss Jean-Paul Marat, the court physician-turned-revolutionary.

On June 24, 1793, Breguet used this friendship to obtain a passport of safe travel. (Within weeks, Marat became the victim of a bathtub stabbing.) Finally, on August 12, Breguet left Paris and headed for Switzerland. It was the start of a two-year exile in his birthplace. Cut off from his Paris workshop, he kept in touch with his workers and relatives by mail. Eighteen of these letters still exist. They vividly describe a once-wealthy watchmaker reduced to concern about the shortage of lemons, eggs and lard, and the price of turkey and chicken.

In Paris the Reign of Terror continued. Marie Antoinette fell to the guillotine. A former Breguet worker was tied to a tree and shot for aristocratic sympathies. Breguet himself was directly accused of political heresy. He was denounced as an *émigré*, his mail was censored, his movements became the subject of

The jeweled hand on this pearl-gray enamel *montre à tact* (right) permitted telling the time by touch. Ring (left) had pin alarm that pricked wearer's finger.

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Compteur militaire regulated speed of marching troops, counting number of paces taken each minute.

covert reports. The Committee of Public Safety confiscated his watch factory.

The exile proved a godsend for his creative powers. Breguet realized that a new France demanded a new line of watches. To that end he developed plans for three classes of simple watches. The cheapest, with one hand and an enamel face, bore the label *troisième classe*. The middle grade was called *seconde classe*, and the highest quality carried a fitting title, *première classe sur les principes des chronomètres*. He also continued to make his luxury watches by special order but on a limited scale.

By the beginning of 1795, his notebooks bulging and his pocketbook empty, Breguet decided to return to Paris. Again his timing was impeccable. The radical elements who had ousted him themselves fell to more moderate forces. A newly formed commission declared: "Times of Justice now follow times of tumult. The citizen Breguet has brought his thoughts back to his adopted homeland. This love of France draws him back."

Always the brilliant businessman, Breguet was also drawn back by a number of financial incentives. Because timepieces were urgently needed by the army and navy, the government refurbished his shop, replaced his tools, stabilized the rent at the Quai and exempted his workers from military service. On April 20, 1795, Breguet entered the city of Paris to begin the most comfortable period of his career. The times of tumult would continue, but they were smoothed considerably by Talleyrand, one of the few who, like Breguet, survived the Revolution. He provided invaluable entrée and it was probably through him that Breguet picked up the business of a Corsican who was also preoccupied by time, Napoleon Bonaparte.

"In the art of war, as in mechanics, time is the grand element between weight and force," Napoleon observed. He bought Breguet watches with abandon. When he wanted to reward Jean-Jérôme Lévie for having hidden him while he was out of favor, he sent an elegant Breguet *perpétuelle*.

Napoleon took a similar watch with him on the Egyptian campaign, but soon after carried a simpler one. The switch registers one of Breguet's few defeats in a lifetime of horological and social victories. According to a Bonaparte chronicler, the Emperor sent the watch back when sand got into the mechanism and stopped it just before Napoleon joined battle with the English. That did not prevent the entire Bonaparte clan from visiting Breguet. Empress Josephine was especially susceptible to the allure of his work.

So was the rest of Europe. By 1811, Breguet was making more than 400,000 francs a year and giving work to 100 of the best watch craftsmen in Europe. Despite protective tariffs and blockades against England and Russia, Breguet widened his international sales. Whether hidden in bootlegs or under coach seats, hundreds of watches passed into the hands of nobles in the court of the Czar and his English counterpart. When Europe was ready for down-to-the-minute warfare, Breguet was there—indeed, one of his watches was on the scene of the battle that ended the career of Breguet's most illustrious client.

Napoleon had planned his attack on the English for 6 in the morning—sharp. But a summer downpour turned the grainfields near Waterloo into mud, forcing him to postpone the battle until 9. Then he postponed it once again. The annals make no mention of whether Napoleon consulted his Breguet, but with all of the delays, no doubt he did. Finally, at 11:30 on June 18, 1815, Bonaparte marched to defeat with 72,000 troops, 236 cannons and one pocket watch. How is it possible that Napoleon lost with such an elegant talisman? His adversary, the Duke of Wellington, was a fan of Breguet as well. Adding irony to conquest, Wellington bought a Breguet originally ordered by one of the Bonapartes. On it was engraved a map of Europe—territory Breguet himself had conquered.

Breguet's seventh and final *pendule sympathique* was made for Duc d'Orléans, son of the King of France.

We keep raisin

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g the standard.

Ahhh, but then there were three. Because soon Honda designed another very special Accord 4-Door Sedan replete with leather seats, a power Moonroof, fuel injection, dual power mirrors, alloy wheels, all standard. And so was created the Honda Accord SE-i.

The Accord 4-Door Sedan. The Accord LX 4-Door. The Accord SE-i. At Honda, after we set the standards, we keep raising them.

*Based on 1984 calendar year *Ward's Automotive Reports* and EPA Interior Volume Index for subcompacts.

HONDA

The Accord 4-Door Sedans

By William H. MacLeish

New England fishermen battle the winter ocean on Georges Bank

On a seven-day trip, the crew of a trawler works around the clock like generations before them. Their future, however, is uncertain

It is fiery cold, this January noon, in the little port of Fairhaven across the harbor from New Bedford. The dock by Hathaway's Machine Shop is six inches deep in ice. Floes clog the harbor, and frost smoke hangs over the gray water.

She lies outboard of an old rusty trawler, and she looks deserted. No, there's a head showing in a window of the pilothouse, and it's reddish. They told me over in Leif Jacobsen's office in the settlement house, where they cash the fishermen's checks, to look for a redhead. That would be Lars Sovik, Leif's son-in-law, captain of the 99-foot stern trawler *Valkyrie*.

Lars comes across the old trawler's deck to give me a hand, smiling slightly at the tape recorder and the notebook bag hanging from my neck. We jump down on *Valkyrie*'s deck by a drum bearded with the yellow chafing gear of a tightly reeled net. Lars walks down a ladder forward. "Did you bring a sleeping bag?"

"No."

"Well, wait." There is a "v" somewhere in the beginning of the words. Lars returns and gives me a blanket, an extra one of his. "You sleep with the Icelander," he says, and leaves.

I shake hands with two men in the galley: Stanley, the engineer, a Norwegian, with the face of a student and a round body; and John, one of the fishermen, a Portuguese, weathered and quiet. Dave the cook is out buying eggs, Stanley says. Ole the mate is around

Valkyrie plows through the ice as she leaves New Bedford harbor for another trip to the fishing grounds.

Work on board the *Valkyrie* never stops. While crew sorts fish, boat tows a second net along the bottom.

Photographs by Richard Howard

Fishermen brave the sea on Georges Bank

After hours on watch, Ole Larsen, mate and later captain of *Valkyrie,* lapses into a "sea stare."

somewhere and the other two fishermen, Tony and the Icelander, will show up any minute. What's the Icelander's name? "Call him Halley," says Stanley. "I can't handle those last names."

I go up the ladder to the wheelhouse to find a place out of the way of the work. There is just enough space forward of the chart table to stand and a couple of handholds to keep me there in a heavy roll. The wheel, with its instrument console, is a few feet away, centered below the wheelhouse windows. The fish-finder is to the left, the automatic pilot and a broken sonar to the right. Equipment for two radars is mounted on the overhead, along with two radios. The lorans are over the chart table. Facing aft, below a big window giving onto the fishing deck, are the trawl controls. On the forward bulkhead is the builder's plaque: "Goudy and Stevens, East Boothbay, Maine, 1967." *Valkyrie* is getting on.

Lars comes and sits on the cracked red plastic seat of the conning chair. He winces as he settles as if his back bothers him. His voice, when he uses it, is deep. He says he went to sea with the Norwegian merchant marine when he was 15. That was in 1954. After four years of that, he came over here and has been fishing ever since. As a Norwegian, Lars is part of one of the most successful ethnic fishing groups in the polyglot ports of New England. As a New Bedford captain, he hails from the richest fishing town, judged by dollar value of annual landings, in the area. A lot of that dollar value comes from catches of groundfish—cod, haddock, flounder, pollack and the like—that swim close over the gravels and sands of Georges Bank, that great submerged thumb stretching from the Nantucket Shoals on up close to Nova Scotia. Georges is, acre for acre, one of the richest fisheries in the world. It is also, wave for wave, one of the wildest. That is where we are going.

Valkyrie can hold 80 tons of fish, Lars tells me, and maybe 30 tons of ice for them. He shows me where we're going: the Leg, a bent finger of shallows out on Georges by what they call the Southeast Part. They got over 30,000 pounds around there last trip, "fourteen or fifteen thousand the first day. Then come a gale o' wind and when it cleared the fish were gone. Too late in the trip to go farther east looking for them. So when we heard another storm was coming the next day, we said to hell with it and went home."

The captains used to call the bottoms by their proper names: Little Georges, Cultivator Shoals, Billy Doyle's Hole, the Leg. Loran came in after the war, providing an electronic fix along lines of position established by the master and slave stations ashore. Now you don't go to Billy Doyle's or the Outside Hole, you go out on a loran line. "We're going out on the twenty-four fifty line," Lars says, poking a finger along the chart. "Maybe twenty-five hundred."

Ole the mate comes in, small and neat, mustache trimmed, smell of after-shave. "Let's go," Lars says and starts the big Caterpillar diesel. We go astern, past *Elizabeth, Viking.* The high-hulled scalloper *Eagle* is out in the harbor ahead of us. We slide by the *George S. Patton,* also owned by Lars' father-in-law, and *Sippican,* still flying her steadying trysail, and *Poseidon,* and *Marissa,* just in, with a veil of ice on her bows. We follow *Eagle* out to the narrow opening in the seawall. We mutter through and on out into Buzzard's Bay, flat as a puddle.

Dave the cook comes up for a look. He is a dry and wiry man who used to skipper small boats fishing inshore. "Hope you have a strong stomach," Dave says to me.

"Well, I'll probably get sick," I say, "but it won't be from your cooking."

"I remember the first trip I made," he says, looking

With just a streak of sunset for color, the ship moves across the cold grayness of the winter ocean.

No work is done on this forward deck, and its neatness contrasts with the cluttered area aft of wheelhouse.

straight ahead. "Wishing I hadn't come. About this time of year." He shakes his head and goes back down to his galley.

Lars steers with his slippered feet, taking it easy as we saunter through the tidy part of the trip. The full sun warms the wheelhouse. Ole leans against the bulkhead. John the fisherman sits in the sonar chair. He has a cigarette going—everybody smokes heavily—and the sun catches the scarred gold of his wedding ring as he tends his butt. There is nothing to do yet. Outward bound.

This article is adapted from Oil and Water: The Struggle for Georges Bank *by William H. MacLeish, published this month by Atlantic Monthly Press.*

The offshore shoals that stretch from Newfoundland to Massachusetts have been one of the world's great fishing grounds since Europeans discovered them more than four centuries ago. New England fishermen have been steering for Georges Bank, the southernmost in the chain, at least since 1800, and by the 1830s their catches of halibut had made Georges a major fishery. The future for the fishermen who today make their living there is an open question. Georges survived the heavy fishing by European trawlers as big as coastal freighters, a stress that ended when the United States declared a 200-mile limit in 1977. And the Bank has survived the drilling for oil earlier in this decade: the wells were dry and the search has been abandoned for now. The federally imposed quotas

Fishermen brave the sea on Georges Bank

Engineer braces himself as the vessel rolls in heavy sea. Crewmen listen for waves that mean trouble.

Fishing continues around the clock. On this trip crewmen worked for eight hours, were off for four.

that so angered fishermen have since proved unworkable and have been replaced by restrictions on fishing areas, seasons and gear. But even as fisheries management gains some flexibility, the fish themselves are getting scarcer. Catches always fluctuate over the years, but the long-term trend for several important species, such as cod, has been downward. Today New England fishing captains, freed of the hated quotas, are faced with landings so small that a few have taken to sinking their boats to collect the insurance. But still, winter and summer, New England captains turn their bows toward Georges Bank.

On *Valkyrie*, we're now through Quick's Hole in the fence of the Elizabeth Islands. Ole has been listening to the radio. "We're in for a spell of weather," he says. As we fight the head tide through the island sounds, Vineyard and then Nantucket, the clutch of boats following us thins out. We find out later that the forecast turned them back.

Lars tells me that *Valkyrie* made 32 trips the year before, each of five or six days. He likes to fish for the

A winter voyage today can last nine days—and still the boat may return with its hold nowhere near full.

whale cod, the big ones, when they come in early in the year, around the sand heaps in 30 or 40 fathoms of water. Not much haddock there, they don't like that terrain. "The whales are in for a month or so," he says, "and then they leave. Nobody knows where they go." He eases his broad, hard body against the chair. "In the spring of the year, they close off a big piece of bottom for the spawning." Then he goes after cod and flatfish in the rips of Nantucket Shoals.

Lars has experimented a bit. Once they rigged *Valkyrie* as a scalloper, but neither he nor Ole liked that. "Get a little breeze of wind, she's wet in the stern. And all the scallop shells flying around." Prices are high, but it's hard and getting harder to find what you're after. Once he tried squid, when the National Marine Fisheries Service asked him to. "They paid us 25 cents the pound and cut it from that, and we couldn't make any money that way." So it was back to what they like and what can pay for the rising costs, such as fuel. A seven-day trip to Georges aboard *Valkyrie* usually works out to 4,000 gallons.

Dave is back. He has heard about the weather. "If only somebody would pay me to stay in 'til April."

"We can't afford to stay in," Ole says. He grins: "The Coast Guard'll save you."

"They're broke. They can't come out." Dave goes on about running back from Georges under the muzzle of the blizzard of '78.

I ask Ole about how much weather *Valkyrie* can take and still fish. "Oh, maybe 15-foot waves, depending on the bottom. If you don't hang up you can fish in a bigger sea. But last trip we hit these big sharp heaps. When you try fishing those, you peel the top right out of the net."

Dave says, "Must be something wrong with anybody who wants to go fishing."

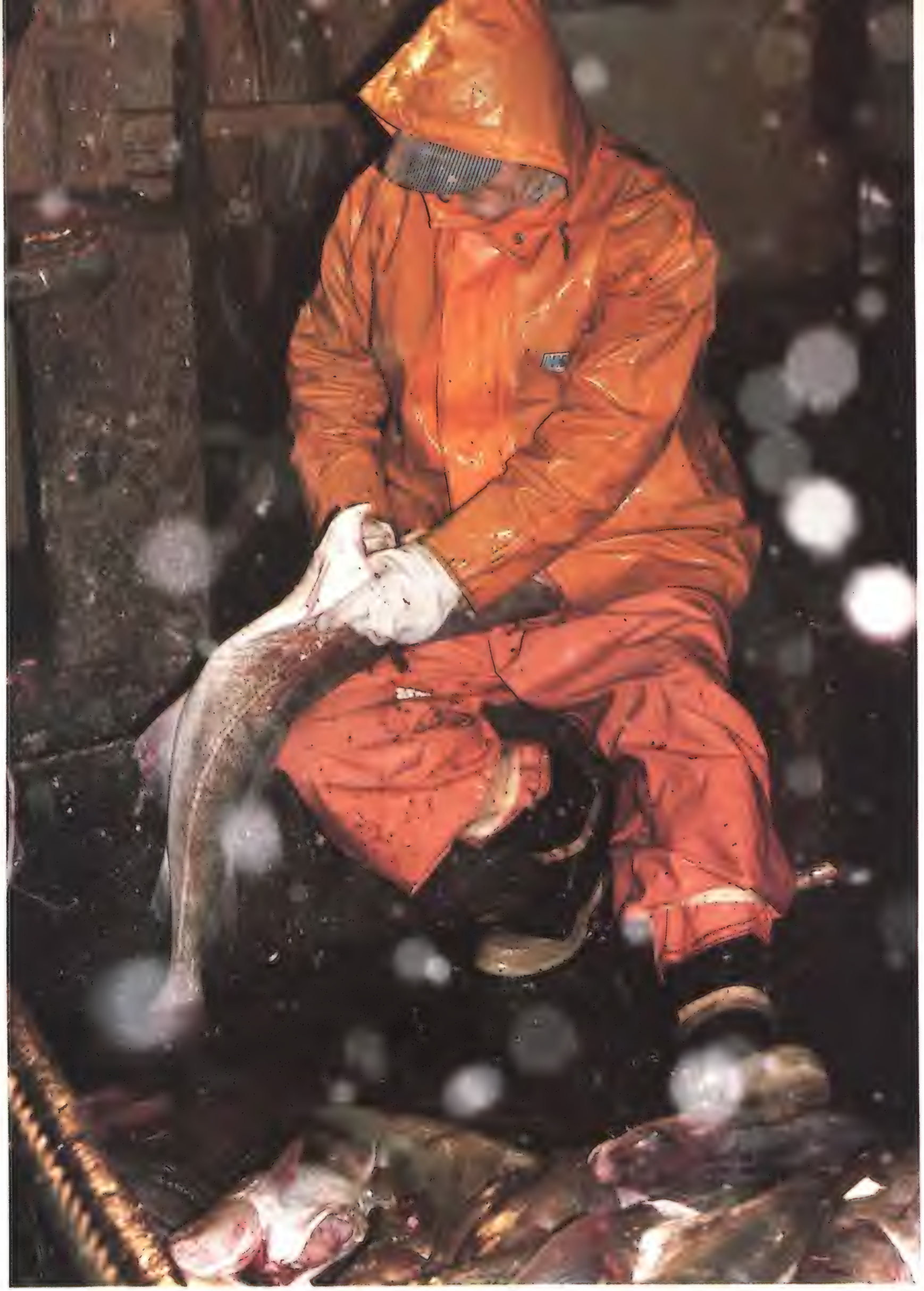
"Well, maybe you better make some pea soup," Ole says. "That'll calm you down."

Supper is ready early. It will be at 7:30 when we're fishing, to accommodate the watches. Just before eating, we pass Nantucket, the light at Great Point, the town sending up its own pulse of light into the winter. Dave has crowded the long, narrow table with lamb, mashed potatoes, carrots, cake, pie, juice, milk. No pea soup. Everybody eats rapidly. No talk. There rarely is when you eat at sea. Just ten minutes of jaws working and long reaching.

After supper I meet the Icelander in our tiny cubicle. He is in his mid-20s, well built, with a smooth face and a serious smile. At first I think he is speaking with excessive politeness. It is partly that and partly that he speaks his flawless English with excessive care. Halley tells me that he was a journalist in Iceland. And that he got away from two traffic tickets in this country because the state troopers didn't want to bother trying to write down his name. It is Hallgrinur Bjorgolfsson. That is why the crew calls him Halley.

When we are lying in our bunks, Halley tells me of

Exhausted crew member rests his head on the mess table, waiting until it is time to go on duty again.



Cook David Bruce cleans codfish in a sheltered nook on deck. His nephew Steve has become the mate.

the British-Icelandic cod war. That was polite, too. The Icelandic patrol boats were very solicitous about the British fishermen working in what Halley's people consider their sea. They would radio them, Halley says, and say, "Please go aft. We are going to shoot you some in the bow."

Second day. Not so cold out. Flat sea. The first set is out, and we're trawling at something under four knots. I am back at my stand, wedged in forward of the chart table. From below us come the smells of coffee and frying, and "Ya, ya" and "Yes." Up comes Ole in oilskins, laughing. "Cook wants to go home."

Dave is right behind him. He says what he always says at mealtime. "Sumpin' to eat?" He takes the wheel while the others have at his table.

One hundred feet of net 142 feet down

We've been trawling a little over an hour, and there is a half-hour to go. One hundred and forty-two feet straight down, way astern of us, a Yankee-41 net made in Germany is fishing, its rollers keeping it almost a foot off the bottom and its floats lifting the headrope, or upper lip, another eight or nine feet. The sand waves are high here. The vertical exaggeration of the bottom profiler makes saw teeth of them. A hundred feet of net bellying behind a mouth 40 feet wide must make quite a commotion in that geography. But up here? What do the birds hear or sense? The sea was empty of them before we went down to breakfast. Now they are rowing around us impatiently.

Ole is in the conning chair, Stanley in the sonar seat. They have the sea stare, when the mind lets go of the clock and thoughts roll with the boat. After a long while, Ole asks me about the oil rigs on Georges. (Four rigs drilled there in the early 1980s, despite efforts of environmental groups and state governments in New England to stop federal lease sales on the Bank.) Ole hasn't paid much attention to those court battles, he says, or to the drilling itself.

Ole says he'd hate to see an oil spill. "But the thing I really don't like is the garbage they leave on the bottom, the pipes, you know. Like when we were starting off in the North Sea. A lot of fishermen hung up on that stuff." I tell Ole that the rig crew I spent time with, down near Lydonia Canyon on the outer edge of the Bank, didn't seem to be litterbugs.

Lars comes up. The bottom is dropping off slightly, and he goes to the trawl controls and slips the cables until he has 70 fathoms out. This is good bottom, he says, and you want enough scope to fish it right. In 15 minutes, he starts up the trawl motor to haul back the net. Slickers come on below, and sea boots. The winch whines, and the cables come in over the stern. Two fishermen are waiting for the trawl doors by the gallows, the vertical members of the steel gantry that frames the stern (p.114). The doors leap from the sea, these lozenge-shaped, 1,500-pound baffles, and they clang hard against the steel. Securing them can be dangerous in bad weather. Tony and Halley work as if someone is counting cadence. In less than 30 seconds, Lars gets the signal to haul back again.

Stanley goes out to the boom winch, and they begin to bring the net aboard, hauling in a section at a time. A huge skate hangs high in the net, caught by the tail in the mesh. The "cod" end of the net (the narrow bottom of the "bag" into which the fish have been funneled) appears, spouting seawater. The fish are massed there in a knot four or five feet across. Stanley guides the bag over the checker boxes, pens fashioned of movable boards. Halley ducks under and pulls the bucket string pursing the cod end, and the fish slap and slide out of the net to the deck.

Lars spins the wheel to starboard, off on another line. Tony and Halley work over the catch with pickers, short metal rods with a spike at a right angle on the end, throwing cod here, haddock there, yellowtail there. The skates go through a vent in the gunwale back to the sea. There are a lot of them. Ole is out there working now. The men go to cutting. One cuts the throats. Another cuts up the belly and pulls out the viscera. "This cold," Lars says, "you don't have to gill the cod and haddock, just gut them." The flatfish lie as they are. "They don't have too much of a gut," says Lars.

A choreography that repeats and repeats

The fish end up in the washing basket, a rectangular colander lying in a tub of water. The basket holds 700 pounds full. The catch takes up half of it. Pretty small. Stanley winches up one end of the basket, and the clean fish tumble down a small hatch onto a trolley running high in the hold on overhead tracks. Later, a fisherman will finish the work, building layers of fish and ice skillfully in the steel-and-aluminum pens of the hold. Now, Stanley pulls the net back off the drum with the boom winch, and the men let enough of it stream in the sea to pull the rest into the wake. The doors are hooked up. They drop like knives into the water, and we are fishing again. The fishermen shuck their oilskins, store them in the big locker aft of the galley. They have spent hugely of their energy and wasted none of it and they are hungry.

The second haul is smaller than the first—mostly skate and ocean pout, thick-lipped, thick-bodied eelish creatures. Cod tend to go off the bottom during the day, hanging where only the huge midwater trawls can get them.

Lars heads northeast. In the middle of the after-

Deck is awash in cod, pollack and skate when the net is dumped after a haul along the bottom.

noon, he finds what he's looking for. He turns the helm over to Ole and goes below for a couple of hours' sleep. The depth finder shows fish just off the bottom. They look like clumps of saplings. We trawl. Ole thinks we may be looking at whiting or baitfish, you never know. He hauls back. "Don't see no bag comin' up. Vait. A little sumpin,' I think." The cod end, the bag, breaches like a sea serpent. Some big cod, 30 pounders. The seabirds are like bats from a cave. They fall in squawking clouds, they pile up on the water. Ole is going around for another pass. "Fish can spook," he says, "but if you're alone you can trawl on 'em for a while." He keeps his eye on the fish-finder. "They're some spotty."

I try to catch Ole off guard and ask him now, in the middle of the hunt, what he likes best about what he does. It doesn't work. "Oh, fishing a good bottom." A puzzled pause, as if he doesn't think much about such things and doesn't like to. Then, "The best is when the man tells you you've got a trip in the hold and you can hang the doors and go home."

Lars takes over the helm a few minutes before 4. We haul back a half-hour later. The corpse of a gull comes in on the wire. Stanley tries to strip him off, but he passes onto the drum to be crushed. There is a tear in the belly of the net. And two tons of fish—a good many small cod—in the bag. They are sorted and cut and lie in the bloody water of the washing basket, eyes bulging at the darkening sky.

Stanley and Ole sharpen their folding knives and tend net. They feel for the holes in the mesh, pulling and twisting until they sense what must be cut away. Then they rebuild, using needles—bobbins, really—to knot in the new body, trim and tight. Meantime, the others set out the spare net, and in the starkness of the working lights the birds show white as doves.

Lars says that a lot of things besides digging into sand heaps will tear nets. Rocks ploughed up by the scallopers. Junk thrown overboard. Treelike sponges. Black mussels. "They 're worse than rocks," says Lars. I ask why he doesn't get the sonar repaired to help him on bad bottoms. "Well, the salesman that sold it left town," he says. He has forgotten how to use it.

Finding fish in a maze of regulations

They are still crocheting away on the torn net when the spare is hauled back. The doors fly toward their stanchions like rusty manta rays. A big bag, mostly skates. Lars says he thinks skates scare fish away, and he goes over to the chart for new ideas. He points out the areas closed in the spawning season. "Doesn't give you much room to work." He runs a finger across the chart to show me the Canadian claim line. "They want half of Georges. If they ever get that, we may as well forget it." (A World Court decision in the fall of 1984 gave Canada about a quarter of Georges Bank.)

The next set catches a lot of pollack. They don't bring much at auction, but consumers are showing interest in them now that they are more interested in fish bargains. Lars says pollack are best taken "coming dark or coming daylight."

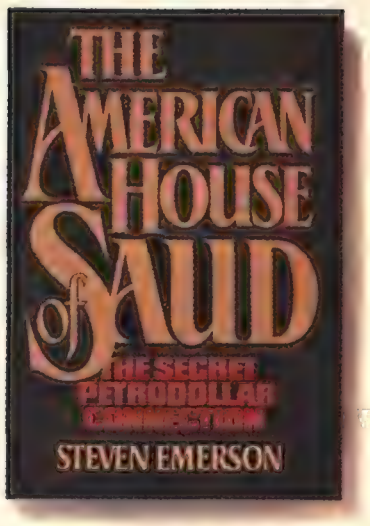
The cod go back to bottom during the night. I can hear *Valkyrie* setting out every couple of hours, and the trawl power system makes sounds that bring me dreams of steam locomotives in the Berkshires, where I grew up.

Third day. A storm came up from the Carolinas last night. Ten-foot seas and a cold haze. We're snugged down. Tony says every time Dave makes pea soup we get a gale. "If you don't like it out here, go home," Dave tells him.

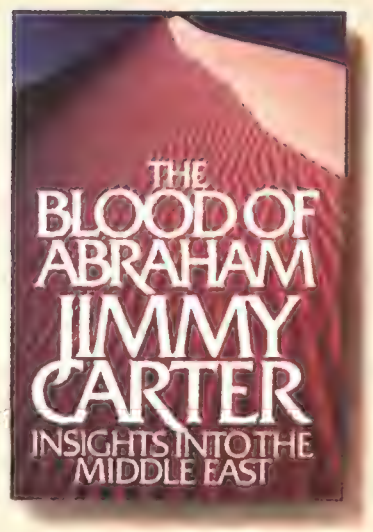
By noon, there's a following sea and a warmish fog. The wind is southerly now, but the forecast says it will back around to the northwest and gust over 45 knots. Ole says Lars told him to "set up to nordard" and fish tonight. Not much point wasting time in this weather daytime fishing.

The radio is quiet. There can't be many boats out

From Power Plays To Political Ploys

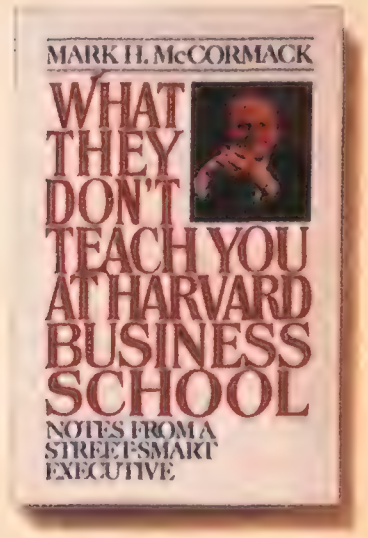


An investigation of Saudi Arabia's manipulation of American foreign and domestic policy.

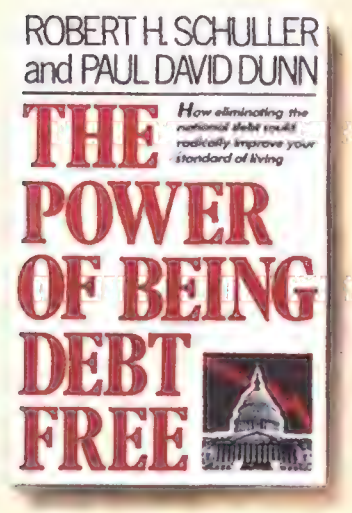


Jimmy Carter's insights into the alliances and hostilities of the Middle East.

A brilliantly bizarre collection of cartoons by comic genius Gary Larson.



Mark McCormack's hard-hitting innovations and philosophies for succeeding in business.


ROBERT H. SCHULLER
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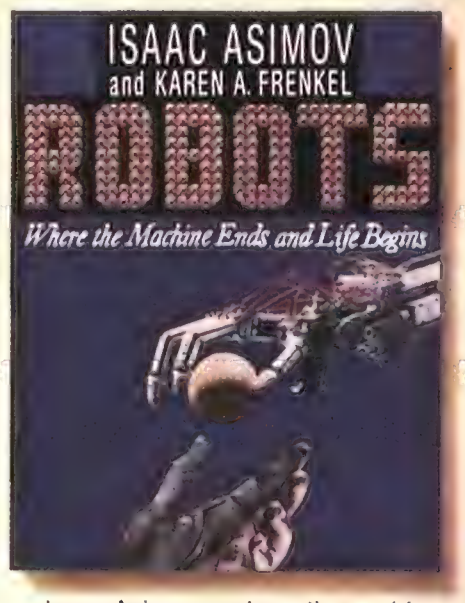
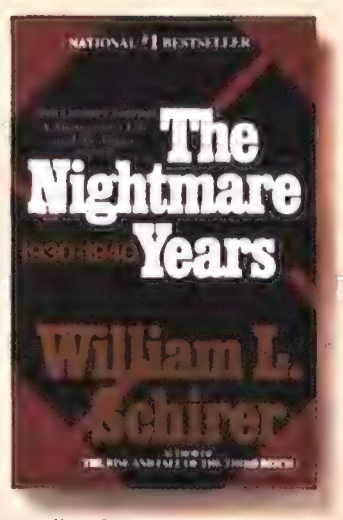
THE POWER OF BEING DEBT FREE
How eliminating the national debt could radically improve your standard of living

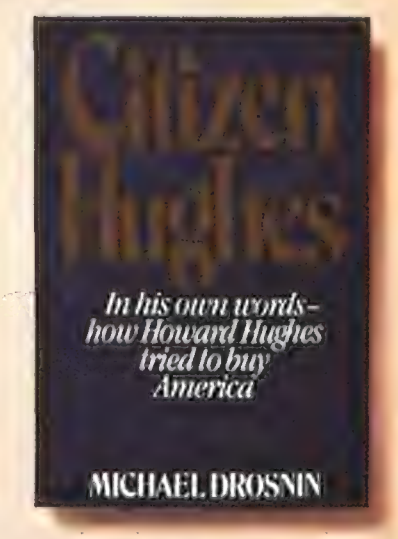
A visionary plan for paying off America's 1.75 trillion dollar national debt.



Isaac Asimov explores the world of robotics and predicts a future with robots that think.



Journalist Schirer gives a chilling eyewitness account of life inside Nazi Germany.



A look at the private thoughts and correspondence of the world's most secretive man, Howard Hughes.

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End of net with fish inside lies on deck. One of otter boards, for keeping net open underwater, hangs at left.

here with us. They know there is a big blow coming. The sea is orogenic today. Combers lift the stern high. The day drags, and I remember the long, dull times at sea in the past when there was nothing, absolutely nothing, new for the observer to observe. Even Conrad was bored at sea.

Valkyrie is bucking so hard the fish-finder isn't working properly. The wind is streaking the waves, and it's shifting. "West-southwest," Ole says. "This is what he was waiting for. We don't usually hang around for long. He was waiting for this to blow through."

Lars comes up. "Every time you get an easterly, then a northerly with the glass falling, you've got to have a nor'wester for the glass to get back up."

Fourth day. Winds around 45 knots, ten-to-15-foot waves. The radio says it will ease. We are drifting in the troughs of a very serious sea: black and white with a touch of moldy green. The wind peels the skin off the rollers, thrums in the booms and gantries, blows harmonics.

Dave: "I hate this time of year."

Tony: "I've seen these storms last three days easy. Can't go home or nothing." Running for home in a blow like this, running over the shallows, is not smart.

Lars: "I think we ought to go into the oil business. This is too hard."

We drift and hang on and curse and talk a little. About money. Tony says he made $45,600 the year before with two months off. Halley made $26,700 for half a year. *Valkyrie*? She cost a half-million new, and it would take a lot more than a million to build her now. Unions? The boat has always been union. That means pulling four percent right off the top for the welfare and pension funds. Lars would like to get away from the union's power, but that would mean getting out of town.

By 6 in the evening we're setting out, still rolling and taking seas in a frighteningly random way. John and Stanley are out on deck readying the net, when the engine dies. We all freeze. Stanley disappears and a minute afterward the blessed muttering resumes. Oil-pressure problem, Stanley says as he comes up from the engine room. "You never know."

You don't. Just before supper, the Coast Guard puts out a call on the radio. There is a man overboard, way north of us. Nobody thinks he could last more than a few minutes in this water. Lars sits a long time in the conning chair, quiet. When Dave comes up with "Sumpin' to eat?" Lars gets up slowly. "I've got 24 winters on Georges Bank. That should be enough."

Fifth day. Sun and a calming sea. There is a big haul in the checkers, almost 5,000 pounds, but the net is badly torn. The needles and knives are flashing. An art, I say to Lars. "They never knew anything else," he says. We go down to breakfast, leaving Dave at the wheel. "We never used to tear up around here," he says in the empty wheelhouse. "Must be them scallopers has been through dredgin' rocks."

The spare net is over, and we're towing against the current. It's tricky. If you give it too much throttle, you'll lift the net right off the bottom. Other boats are out now that the weather is breaking up a bit, and Lars is working to fill the quotas so he can get to auction in New Bedford before they do. Right now, he says, the New Bedford prices are high. Haddock going for over $2 a pound at the end of the week, cod for 90 cents to $1.75, yellowtail for $1.25. As against about 30 cents when the market has what it wants.

No sign of life vests

Valkyrie hauls back. The rag markers come in, ten fathoms apart. Three rags together tell Lars the doors are close in, and he eases off on the winch throttle. We are still taking seas. The fishermen are too busy to look for the big waves. They hear them and make their escape just before it is too late. No sign of life vests. Their bulk could be dangerous for a man working close to the cables and drums and doors. The boat does carry survival suits: head-to-toe cocoons of insulated plastic that can preserve life for hours or days in the water. Lars jokes that he told the salesman to use Stanley as a model but that they couldn't find a suit to fit him. Lars says he has forgotten how to get into the damn things.

Nothing this haul. It's a water tow. Lars spins the wheel and goes over the charts. While he's rummaging around, he finds one that shows the fjords where he

WHY WAIT FOR
HER BIRTHDAY?

WHY WAIT FOR
HIS BIRTHDAY?

WHY WAIT FOR
FATHER'S DAY?

WHY WAIT FOR
YOUR NEW APARTMENT?

WHY WAIT FOR
SATURDAY NIGHT?

WHY WAIT FOR
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DRAMBUIE OVER ICE TONIGHT.

Lars Sovik, skipper of *Valkyrie*, has since moved on to captain a newer, larger fishing vessel.

grew up. He shows me the pinpoint of a small town at the head of one of them: his. He shows me the city of Stavanger, a booming supply base for the rigs and production platforms in the North Sea. "The prices," he says. "Everything is out of sight there."

"Hear the weather?" says some skipper on the radio.

"No," says another, "and I don't aim to 'til it's time to go in."

Sixth day. Bitter cold with heavy seas and another storm coming. *Valkyrie* is covered with rime. The radars are icing up, and the one Lars prefers for close-in work has blown a fuse. Lars is groping in the drawers for a one-amp replacement. He can't find one, so Stanley takes a five-amp fuse from the big radio. Lars is jumpy. The closer you get to land, the colder it gets and the more you ice up. If he ices too badly he'll miss the Monday auction, the one he wants. He hears me talking to Ole about oil spills and turns testily: "Don't worry about the oil and about the fish. Mother Nature will take care of that in her own way." He puts in the fuse. It works.

Seventh day. Colder still. Ice crystals in the water act as oil does on the waves. Lars totals up the catch: 5,000 pounds of haddock, 37,000 of cod, 500 of yellowtail, 2,500 of lemon sole, 4,500 of pollack. "We're lucky to get that," he says. "But it's not what you get, it's what you get for it."

There were moments last night I will not forget. *Valkyrie*'s roll got more pronounced as she iced, and she hung, heavy, before swinging over. Dave got so nervous he forgot to bitch. Lars was slamming the seas, trying to make that market just 60 miles away. The ice won. He had to throttle back to keep the spray from freezing so thick on the bows that it went past the danger point. We had ice mallets, but it would not have been pleasant to chip. Lars and Ole kept the radar working by dousing the base of the revolving arm with hot water. Now we're making ten knots in Nantucket Sound in a flat calm. We're so iced up we look as if we belong on a cake.

Lars calls home and finds out that the Coast Guard icebreaker is working in the harbor. *Valkyrie*'s steel hull will have no trouble, but the old wooden-hulled trawlers will have to watch themselves this frozen day. We come through Quick's Hole again into light pancake ice in Buzzard's Bay. A big Coast Guard cutter plows through it outside New Bedford, leaving a black wake of open water.

Eighth day. New Bedford holds its auctions in a handsome, small brick building on the town pier: scallops at 7 A.M., groundfish at 8. *Valkyrie* is the only boat on the board, so there's next to no auction. Tichon, the big processor in town, buys the catch. Halley is in a room separated from the auction room by big glass windows. Stanley is there and John. Lars comes in later. About 20 men in all are standing around. A few of them are talking about the fisherman lost overboard. Halley tells a friend, "You got to accept the possibility that something will happen to you. If you die, you die."

"Yeah," says the friend. "I used to think that before I went to Vietnam. No more."

Halley and I drive over to the processor's dock. Lumpers, the longshoremen of the fishing industry, are on board, and canvas buckets are swinging down to empty the hold. Halley and Dave take turns standing by the chute where the buckets are unloaded and the fish packed into boxes. They count the boxes and make sure the lumpers don't put more than a hundred pounds in each.

The enforcement officer from the National Marine Fisheries Service goes aboard to check the catch. After he leaves, Stanley comes over. He looks at the three inches of ice on the wheelhouse. "Hope that melts before Friday." Friday is when they go out again.

Halley gives a lumper a hard time for throwing a big cod into a box already almost full. "What's your trouble?" says the kid. "You guys get these for free."

Engineer lends a hand at mending net. One net is repaired while the other is towed along the bottom.

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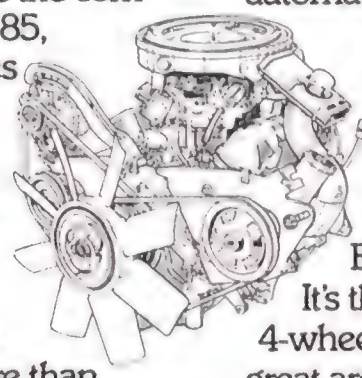

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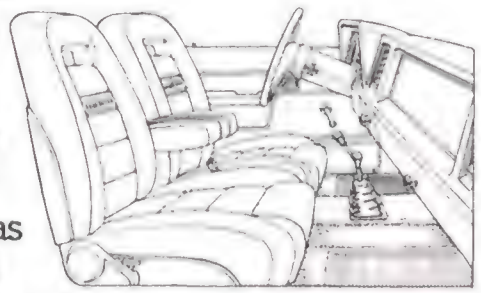

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ROYAL LITERARY FUND
Lana Yerkes '85

By Fred Strebeigh

Keeping the hacks and geniuses out of debtors' prison

From Coleridge to Conrad and beyond, the Royal Literary Fund has given handouts to writers—all needy, and some talented

In July 1915, three needy writers appealed for help, as writers have for the past two centuries, to the Royal Literary Fund. The first, a man in his 40s, wrote from his seashore club. "There were years in which I made £1,000"—an income twice that of the average lawyer or doctor. But now, unable to sell a word, he lived in a "mere hut," tended only by one wife, one daughter and one maid. As the Fund required, he presented voluminous evidence that he was a man of literature. He submitted copies of *Sunshine and Sport in Florida and the West Indies* and *An Idler in the Near East* as well as other miscellaneous records of his adventures in sun and fun.

After the adventurer came a younger man, who hoped to become a novelist. He stated his profession as high school teacher and his present income as "None." His two published books had cost him more than they had earned him. The publishers of his second book even forced him to buy 120 copies wholesale, and he gave his third, in sections, to a little journal as penniless as he. He and his family, driven by war from the Mediterranean to the Alps, had no warm clothes and feared the coming winter.

After the adventurer and the would-be novelist came a dramatist, boasting works in theatrical comedy and dramatic criticism as well as stage adaptations of *Paradise Lost* and *Pilgrim's Progress*. To prove his literary worth, he sent the committee *one* book, explaining that he had no money to buy his others. Severe illness and nervous breakdown, he said, left him unable to "use my pen but little."

Since the late 1700s, such woes have come, meeting after meeting, before the general committee of the Royal Literary Fund, now the oldest literary association in Great Britain and for almost 200 years the principal refuge for writers in distress. But despite its importance for literature's impoverished authors and its contribution to literature's written wealth, the Fund has eluded publicity. For two centuries it has been one of the most discreet of charities, disclosing almost nothing about its recipients and forbidding them to publicize its largesse. Now, however, the Fund has decided to make available its reserve of hitherto unpublished lore. Historians and biographers have called it a gold mine. And rightly so, for in its veins runs a rich record of literature's greats, its not-so-greats and a few of its ingrates.

The committee members who assembled in the late summer of 1915 to consider the plight of the three writers typified the Fund's blend of the literate and

In 1790, when the Fund began, it was hard for writers to survive without toadying up to a wealthy patron.

Illustrations by Lane Yerkes

After trading half a year's army bonus for pen, ink and paper, one applicant hid in a beanfield to write.

the landed. Present were Sir Sidney Lee, editor of the monumental *Dictionary of National Biography*; William Paton Ker, soon to become professor of poetry at Oxford; and stalker of literary lions Edmund Gosse, known for introducing Scandinavian literature to Britain and for a splendid memoir called *Father and Son*. Present also was the 1st Baron Weardale, whose main literary connection seems to have been marriage to the widow of a relative of the great Russian novelist Leo Tolstoy. Absent from this particular meeting were the 2nd Baron Tennyson, son of Alfred, Lord Tennyson, and Sir J. M. Barrie, author of *Peter Pan*.

The committee sought neither to support a writer's future work nor to conduct a writers' talent contest. Though it was required to determine that applicants show some literary merit, it sought primarily to ease financial anguish. Its decisions were a bit eccentric at times. At the 1915 meeting, for instance, the members gave first place, so to speak, an outright grant of £125, to the adventurer. The Fund's secretary did suggest the fellow get a job. Instead, the adventurer volunteered with the Red Cross on the Russian front, leaving the Literary Fund to tend his wife (and, presumably, his daughter and maid), who received a further £100 grant only a year after the adventurer received the first.

Last place at the July 1915 meeting went to the dramatist. The Fund deemed his literary claim "insufficient." It granted not a penny. His comedy, one committee member judged, had no wit aside from "a certain spice of feeble naughtiness."

Enraged, the dramatist bombarded the Fund's secretary with whiny bombast. He had been robbed of glory (a movie company, planning to film his *Paradise Lost* as a "Kinemacolour" extravaganza "for all the World," had just gone bankrupt). He had been scourged by race prejudice (he was an honest Scot, while the Literary Fund's secretary belonged "to a race of liars"—the Welsh). He had been victim of a gross mistake ("I was taken in error for a spy" and "followed by detectives"). Thus haunted, he fell into fits and then into an asylum ("the class I had to *be with & see* daily, was terrible indeed"). His darkest fear, though, was that his own family had attacked him before the august committee of the Royal Literary Fund ("my brother is not partial to dramatic literature").

While the adventurer won and the dramatist lost, the would-be novelist took second place, three installments of £25 each. Not just the money but the Fund's show of support—the first more or less official imprimatur he had received—seem to have enriched his new book. He called it *Ulysses*. His name was James Joyce.

The Fund began not to save novelists from cold, or adventurers from a scarcity of domestic help, but to save writers from prison and death. Anyone who knew literary life in 18th-century England knew how hard it was for a writer to survive without toadying up to a wealthy patron. In Grub Street, an ugly strip in the

The author is a needy but deserving tutor at Yale. He has written for SMITHSONIAN *on the Falklands and the* Dictionary of American Regional English.

For three days he scribbled and ate beans, finishing a chapter. Later he sent the farmer a copy of his book.

Moorfields section of London, publishers forced their hack writers to starve in frigid garrets, sometimes sleeping three in a bed. Samuel Johnson's friend, the poet and dramatist Richard Savage, was a celebrated case who spent his nights in "Cellars among the Riot and Filth of the meanest and most profligate rabble" and died in debtors' prison.

The Royal Literary Fund's founder was an eccentric but humane cleric named David Williams, who migrated from the coal-mining valleys of Wales to London late in 1770. His unconventionality extended to his religious practices. He held services based not on *The Book of Common Prayer* but on a liturgy of his own writing—one that welcomed "Jews and Gentiles, Christians and Mahometans" and conspicuously excluded the immortality of the soul and the existence of Christ. It also extended to his choice of friends: revolutionaries like Benjamin Franklin, actors like David Garrick, and numerous women (among whom, he calculated, "I spent nineteen parts in twenty of my time"). Such radicalism made freethinkers like Voltaire and Rousseau proclaim themselves Williams' disciples. But it alienated his congregation, which withered away. Undaunted, Williams shifted his services from a chapel to a coffeehouse, replacing sermons with lectures and concluding with conversation, dinner and wine.

He first proposed creation of the Fund at a meeting in 1773 of a small London club that he and Ben Franklin helped found and which met at the Old Slaughter Coffee House—until Franklin departed one step ahead of the sheriff in 1774, headed for America and the Revolution. Little happened to his proposal until 1788 when Floyer Sydenham, a well-known classical scholar and friend of Williams' coffeehouse comrades, died in debtors' prison. His crime? He had failed to pay a food bill. Williams started raising money immediately.

The Literary Fund's early years abound with chronicles of poverty and tales of debtors' prison, that peculiar institution which removed the indebted from almost any work that could help them repay creditors. About 120 applicants in the Fund's early years sought aid while actually imprisoned for debt.

One writer of dramatic pieces, history and odes was removed, with his ill wife, to a crowded cell in Fleet Prison for want of £200. From there he applied to Williams for the few shillings that would allow him to rent a private prison cell and so live more easily.

A few misinformed and faltering writers actually looked to debtors' prison as a retreat from creditors and a haven for composing. How wrong they were.

As a judge Dickens reviewed submissions of all sorts, but he felt the Fund treated writers like "beggars."

Impoverished Coleridge got £10½ in 1796, almost as much as he later earned from *Lyrical Ballads*.

After getting into King's Bench Prison, one writer complained it was "so crowded that there are from three to six persons in a Room." Instead of enjoying the calm he had hoped for, he found he had to live "in a Whirlwind which blots out . . . the works of the imagination and the light of the mind." He too sought rent to make his prison private.

Also from prison came a strange appeal from a writer named William Henry Ireland, whose mature work had suffered high abuse for a peculiar reason. In his youth he had produced one fabulously acclaimed play, *Vortigern*, which Richard Brinsley Sheridan staged in 1796 at the Theatre Royal in Drury Lane. Ireland passed it off, unfortunately, as a play by Shakespeare though it had little to offer its audience except a king-killing usurper, a poison-swallowing lover and a singing fool. Ireland's forgery depended more on penmanship than dramatic art, but the Fund apparently judged that anyone who could write like Shakespeare must have talent. It granted Ireland money to leave prison and further his own writing. He rewarded this confidence by pouring out Gothic romances, historical dramas, antique-sounding ballads and commissioned flatteries to great men—producing a total of 67 published and 23 unpublished works in 35 years.

Other applicants escaped debtors' prison but fell into the lowest of literary professions. One sold "ink by commission." Another made a living by "the folding of printed sheets for Bookbinders."

Suffering widowhood and a broken leg

Even those who survived by writing seemed trapped in literature's lower reaches. A Mrs. Eliza Parsons wrote that after suffering widowhood and a broken leg, she was forced to "avail myself of the fashion of the times and write novels." They must have been easy to write. In a period of 12 years she turned out 65 volumes (along with three applications to the Fund). But they may not have been so easy to read. Mrs. Parsons herself described these books as "moral" but "deficient in wit and spirit."

Another woman novelist carried in her application by hand. "The cloaths I now wear to deliver this letter," she explained, "are borrowed of a humane friend." She had sold her own to feed her child.

The Fund also met a powerful urge to create. One applicant described the genesis of his first book. After trading half-a-year's army bonus for a pen, ink and a quire of writing paper, he hid out in a farmer's beanfield three miles from Glasgow. There he lay for three days and nights, writing his first chapter and eating beans. As payment, he sent the farmer a copy of his published book.

The Fund also encountered genius. A young writer of poetry, criticism and drama applied for help in 1796. He had scant money and "no profession," he explained. His wife verged on childbirth and his mother-in-law verged on death. Just as it had aided the others, the Rev. David Williams' fund granted £10½ to one of England's greatest poet-critics, Samuel Taylor Coleridge. The £10½, no great sum, was still almost as much as he earned two years later for his half of *Lyrical Ballads*, with which he and his friend William Wordsworth sounded the first clarion call of the British Romantic movement and which contained many of their best-known poems, including "The Rime of the Ancient Mariner" and "Tintern Abbey."

By mid-19th century, the Fund had gained financial solvency, thanks in part to sumptuous fund-raising dinners and to the patronage of Queen Victoria and

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The Royal Literary Fund and how it grew

Fund's richest source is an A. A. Milne gift: royalties from something called the Pooh Properties Trust.

Prince Albert, who gave the Fund permission to add "Royal" to its name. In 1839, for example, there were 88 grants totaling £1,590. The largest, eight grants at £50 each, nearly equaled an average workingman's salary for a year—or about a fifth of the minimum considered necessary for a gentleman. The smallest, 11 at £5 each, would have bought sturdy wool coats for a family of five. Among those 88 beneficiaries the Fund listed three dramatists, seven novelists and 19 poets. Some poets, like Sir Walter Scott and Lord Byron, made vast sums from verse, but by and large, like their counterparts today, poets were the least remunerated of writers. The Fund also aided contributors to such fields as medicine (five "authors relieved"), science (six), theology (seven) and topography (eight)—a range that considerably stretches the term "literary."

The year 1839 also saw a significant addition to the Fund's committee of judges: Britain's most popular young novelist, 27-year-old Charles Dickens, already the best-selling author of *The Pickwick Papers* and *Nicholas Nickleby*.

His first meeting proved the busiest in the Fund's history. No record remains of how Dickens viewed the literature in question: a *History of Lymington,* a *Pronouncing Dictionary* for Gaelic, a learned *Treatise on the Coco-nut Palm*. Some 80 papers published in *The London Medical and Surgical Journal* and a *Syriac Grammar*. A few instructive *Rhymes on Geography & History*. A doctor's *Account of British Guiana*. A book on popery, *Antipopopriestian. Peter Parley's Child's First Step* and some pamphlets in Polish.

However Dickens judged the literary merit of these works, he must have viewed their authors' needs with anguish. For the applicants seemed to share but one bond—poverty as grim as any Dickens had known in his youth or would write about in his lifetime:

- A lyricist candidly admitted that he would "frequently faint three or four times a day at my writing-desk." Granted £25.
- A poet, victim of Fleet Prison and a broken marriage, said his poems had become "too mournful for the market." Granted £5.
- A writer of opera reported the theft of her major work and her efforts to support five children by writing while trapped in debtors' prison. Granted £10.
- A writer on the subject of mathematics confided that he was "bereft of a wife, not through death but *adultery*" and that his six young children had "nothing to look up to for assistance, but the Literary Fund Society." Granted £5.
- A biographer who had lost his health to overwork, his wife to lunacy and his three sons to death asked the Fund's help for the 18th time. Granted £10.

The Fund's response to immense anguish with small sums—as low as what some worthies paid for a night's ostentation at the Fund's annual banquets—may have been too much for Dickens. Though he remained active in the Fund through the 1850s, he shifted gradually from supporter to reformer to attacker. In pamphlets and speeches he championed the author's right to a living independent of handouts and swore he would "change the status of the literary man in England." He sought to supplant the Fund with a new institution, the Guild of Literature and Art, that would reward talented writers with pensions, grants and hideaway retreats, functioning as a cross between, in modern terms, a Guggenheim Foundation and a MacDowell Colony. When his Guild proved slow to begin, he sought to quickly reshape the Fund as a grander guild. He would graft onto it a membership of honorary "associates" including "the most distinguished literary men of all countries," would turn its house into a literary club and add a college to it "for the honor of literature and the service of literary men."

With the 1985 Dodge 600 ES Turbo Convertible, the sky's the limit. Whether you enjoy the thrill of driving under the sun or the moon, there's an equal thrill under the hood. It's provided by a 2.2-liter, fuel-injected, turbocharged engine that's helped make Chrysler the largest manufacturer and seller of turbocharged cars in the world. It's an engine that's teamed up with fast-ratio power steering. A sport suspension. And Goodyear Eagle GTs fitted to Shelby road wheels. Standard features include leather bucket seats. Leather-wrapped tilt steering wheel. Electronically tuned AM stereo/FM stereo with cassette player. Power windows. Power top. Automatic transmission. And over 40 other good things.

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BUCKLE UP FOR SAFETY.

Early grants often were to get writers out of debtors' prison, or to rent a private cell there for writing.

To achieve these aims, some of which David Williams had once dreamed of but had to abandon, Dickens proposed gambling the Fund's capital in a major fund-raising effort. When the Fund's more conservative officers rejected the scheme, he attacked the Fund for crushing the writers' pride and treating them as "beggars." He swore he would "reform or ruin" it.

Dickens himself, frustrated in his goal to transform the national status of writers, may have been unable to see the Fund through the eyes of its humbler beneficiaries, many of whom might have gained little from a club comprising Dickens and the literati of all lands. One writer who came to the Fund just before Dickens did, but as plaintiff and not as judge, probably spoke for dozens when he praised it as a "little lighthouse on the gloomy sea of literature" toward which both known and unknown writers had steered "when there was no other human help."

As it happens, the Fund's light outlasted both Dickens and his Guild. After his death the Fund supported a few of his relatives and friends in their distress and inherited half the Guild's assets when Parliament dissolved it in 1897. And as the 20th century began, the Royal Literary Fund still shone forth to the writers of its age, some with names well known.

In 1902, 45-year-old Joseph Conrad appealed to the Fund. Supporting letters followed from John Galsworthy, H. G. Wells and Henry James, who pointed out that "to be very serious and subtle isn't one of the paths to fortune." From 1902 to 1908 Conrad received grants totaling £500 (nearly enough, spread over that period, to pay the salary of a London postman).

One hundred pounds to author of Dracula

In 1911, 63-year-old Bram Stoker applied and the Fund gave £100 to the author of *Dracula.* The vampire made no fortune for its creator, who did not live to receive the $40,000 paid for film rights in 1931.

In 1914 came 29-year-old D. H. Lawrence, recommended as "a man of something like genius with a wife and £4 in the world" and as "author of *Sons and Lovers.*" Lawrence received £50 from the Fund in 1914 and again in 1918, the total being exactly the sum he got from the British publisher of *Sons and Lovers.*

Today the Fund labors on, at inflated prices. Last year the general committee, now presided over by Arthur Crook, genial former editor of London's *Times Literary Supplement,* gave away more than £98,000. The average grant exceeded £1,250. The Fund's modern files also seem to suggest that writers suffer less dire woes than they used to. Today the Fund sometimes helps an author hold on to an ample home, negotiate the thickets of social security, even buy a lawn mower. But the Rev. David Williams would certainly understand the efforts of the Fund's kind assistant secretary, Elizabeth Gotch, to calm the woman who three times has attempted suicide, or to provide good cheer and the help of a typist for a man, fingers and eyesight gone, who lives in a modern leper colony.

Last year the Fund received income of about £65,000 from investments and more than £10,000 in donations from supporters who include Margaret Drabble, Daphne du Maurier, Graham Greene, Doris Lessing and Queen Elizabeth II. Most important, it gets royalties (in excess of £147,000) from bequests of writers whose work lives on. Three-fifths of the Fund's income last year came from the estate of A. A. Milne—or, more precisely, £135,000 came from Winnie-the-Pooh.

The Fund's archives might never have been made generally available to scholars had the Fund not considered, a few years ago, the possibility of selling its accumulated documents. Partly to discover their

value, it hired a young scholar, Nigel Cross, as archivist. He quickly discovered that the archives represented, as Professor Richard Ellmann of Oxford puts it, "one of the most valuable and least-known sources for confidential information about the great writers of the last century and this one."

Plans to sell shifted to plans to publish. Last year all the Fund's records for the years from its founding until 1918 became widely accessible for the first time. The documents themselves remain in the Fund's still-humble London offices, lining the high walls of a room that, a former Fund president notes, has the charm of a "vertical coffin." The archives' rich resources, however, are spreading to libraries around the world, which now are investing £3,000 each for copies preserved on 145 reels by World Microfilms Publications.

The Fund intends to keep current records secret for a period of 50 years, but in 1990 it may publish another chunk. Some years from now libraries will probably invest again. According to a former Fund secretary, more candid modern applications and letters of recommendation will offer more detail than the older ones—including various "illicit relationships and all sorts of funny things." They will certainly offer new opportunities for public error: one London newspaper, for example, recently spread the notion that James Joyce suffered from lice. In fact, the archives do contain one letter mentioning lice, written on behalf of James Joyce by Ezra Pound and sent to the Fund by William Butler Yeats. In it Pound spoke not just for Joyce but for many hacks and geniuses who have applied to the Fund. But Pound spoke not of bloodsucking insects. He merely remarked that publishers, from whom Joyce certainly suffered, were "lice."

New applications suggest writers have different needs than when David Williams started his fund.

Average grant last year was £1,250. But grants go to prevent suicide, save a home, even buy a lawn mower.

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Frieze on the south side of the Ara Pacis, Rome. 13 B.C.

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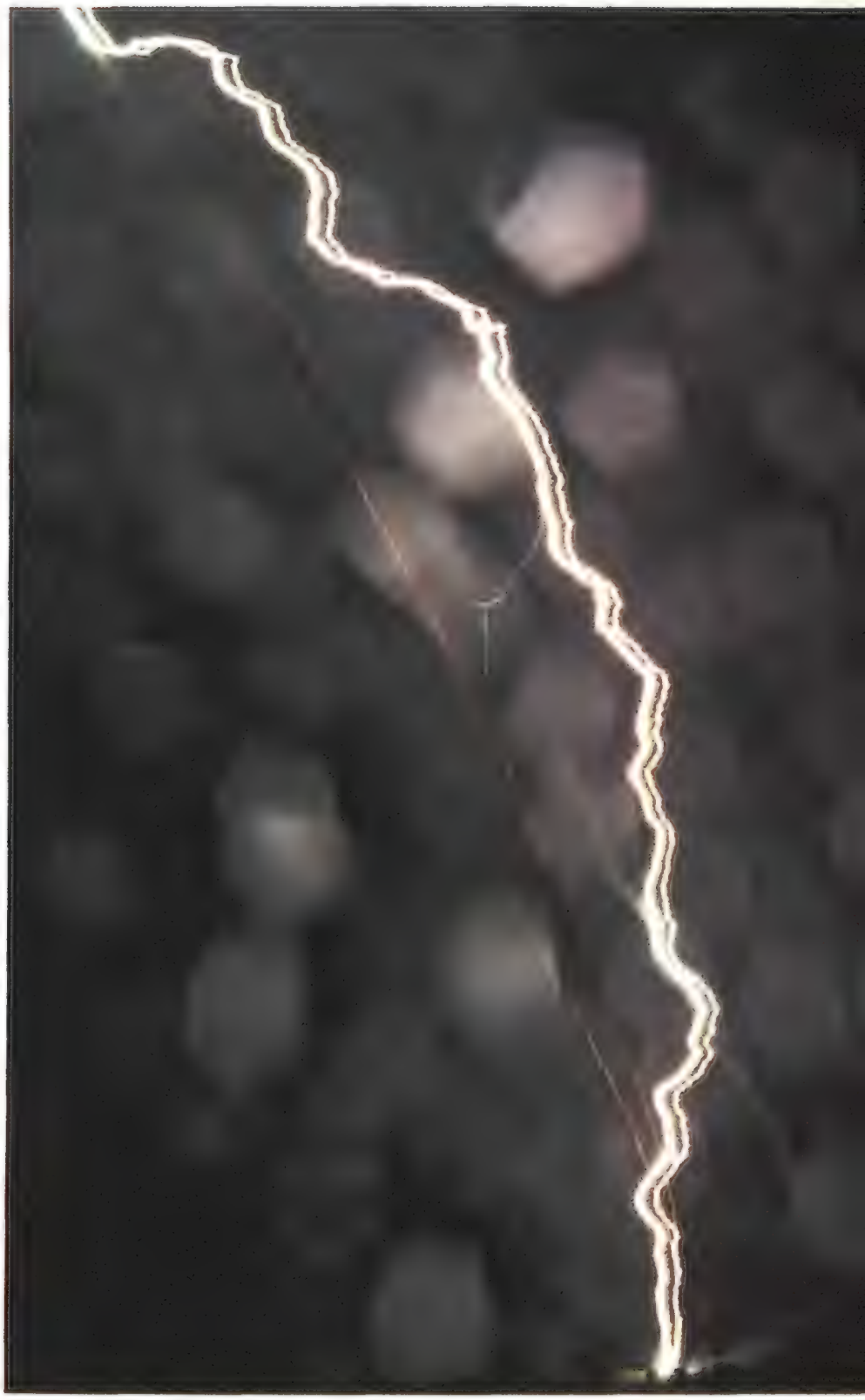
Jet fuel blazing at 1,900 degrees F severely tests
a nuclear-waste canister carried on a railroad car.

By James K. Page jr.

Torture-testing high technology in New Mexico

Fires, explosions, collisions and nuclear meltdowns are daily routine at Sandia Labs, where scientists' mission means mayhem

The car had already been run into a wall at 80 miles per hour, a trial also faced by tractor-trailers.



A strike is deliberately triggered by rocket-drawn wire to test a lightning arrester on the ground.

It is a place of terawatts and nanoseconds and other unimaginable measures, a place where detonations, infernos and bolts of lightning are routine events, where lasers peer into the violent innards of an engine's cylinders, simulated nuclear reactor cores melt down on command, and where more power than can be produced by all the U.S. utilities at one time dances briefly on the head of a pin. It is Sandia National Laboratories, headquartered on the southern edge of Albuquerque, New Mexico, where 2,700 scientists and engineers are engaged in some of the most sophisticated, futuristic research in the world.

Viewed from above, Sandia is a cluttered sprawl of polystyle buildings—countless buildings that obviously accreted hurriedly over time and without the slightest thought for exterior esthetics. Beyond, in a 40-square-mile area of desert called Coyote Canyon Test Complex, other Sandia installations have erupted here and there—solar arrays, giant tubes, ponds, bunkers—ideal places to do "nasty things," in the words of Sandia's president, physicist and former Bell Labs executive George C. Dacey. The nasty things that go on are the daily torture of high technology.

Most of the Sandia installations—the tech areas,

In the desert outside Albuquerque, a science city has risen since the postwar beginnings in 1945.

they are called—are surrounded by chain link and barbed wire, with entrances presided over by severe-looking men in military dress with emblems that say DOE SWAT and sport a bald eagle clutching a bolt of lightning in its talons. The eagle and lightning are symbolic of the Department of Energy, and Sandia is operated in DOE's behalf by AT&T Technologies Inc. on a no-fee, no-profit basis. The arrangement goes back to a letter in 1949 from President Truman to Leroy A. Wilson, then president of AT&T, suggesting forcefully that the telephone company take on the job of giving the then fledgling laboratory "the best possible technical direction."

Sandia's main mission now, as in 1949, is the engineering of all the nonnuclear components of nuclear weapons, and while security has always been important, it is of yet greater concern as the threat of terrorism increases. But Sandia is also a multiprogram facility involved in energy research and development and a host of other related high-tech realms including computer technology, microchip etching, encryption, materials research and test-ban verification devices. Sandia is, in fact, something of an enigma: it is the "engineering" national laboratory but it does basic scientific research as well in just about all of the sciences but biology.

Everything is measured at Sandia, measured and the results stored in ever-present computers, even events that happen far too fast for the human eye to register or the lay mind really to comprehend. Last autumn, for example, a rocket mounted on a sled that runs over 5,000 feet of rails was accelerated to a speed of 6,000 feet per second—a fleeting instant of sheer fury. At the other end of the track, at precisely the right microsecond, an explosive charge was detonated, hurling an 11-inch-wide nylon plate toward the rocket's nose at 9,000 feet per second. The rocket was tracked by laser and videotaped, and the impact recorded by a camera that takes 8,000 frames per second. (Sandia has cameras that can take well over a million frames per second.) This violence—all condensed into less than two seconds from beginning to end—was to test the functioning of the fuse in the nose cone under simulated impact conditions.

Computer codes are the name of the game: they are what predict the behavior of everything from a weapons component to an abandoned coal mine or the nose cones of the space shuttle's booster rockets when they hit the ocean surface. Sandia has the most sophisticated environmental simulation capacity anywhere: putting things to the test is one of Sandia's major functions. Take, first, a missile. In the worst of all situations —that is (as Sandia scientists are quick to point out), its use—it could be battered in a number of ways from the moment of launch. Huge shock waves might buffet it as it emerged from the silo. Above the atmosphere, it could be bombarded with awesome pulses of neutrons and high-energy x rays. More shock would occur on reentry (the atmosphere absorbing most x rays) and then it would be subject to neutron and gamma-ray bombardment. If any of the thousands of components in the missile failed to withstand this violent treatment, the missile would be a dud.

The components can be subjected to actual bombardment in an underground nuclear explosion—and many are—in testing grounds in Nevada, but these tests are extremely expensive, costing tens of millions of dollars each. Only two such tests are scheduled for 1985. So at Sandia, the world's most inventive simulators produce their own special effects—effects that make most of Hollywood's high-tech efforts look like mere hot-dogging.

Shock-wave tubes on the Thunder Range

How, for example, does one produce a shock wave equivalent to that of a nuclear blast?

Floyd Matthews, a mechanical engineer, is an expert at this. He presides over a barren piece of real estate called the Thunder Range. It resembles a surreal junkyard littered with large steel tubes that are somehow reminiscent of the giant desert worms in Frank Herbert's *Dune*. The granddaddy of them all is 19 feet in diameter for 325 of its total length of 580 feet, the remainder being less than six feet in diameter. Detonate 1,000 pounds of explosives in the small

James K. Page jr. is a free-lance writer whose latest book, Pastorale: A Natural History of Sorts, *is being published this month by W. W. Norton.*

Satellite component gets a workout on a shaker to see if it can withstand the stresses of a launch.

Special apparatus in this laboratory can vibrate objects being tested as many as 3,000 times a second.

This underground centrifuge can spin payloads weighing up to eight tons at the end of its 29-foot arm. It can test missile components—or models of coal mines—at 100 times the force of gravity on Earth.

A nose cone from the shuttle's recoverable boosters is dropped into a test pool at about 50 miles an hour.

In a new crystal-growing machine, molecular beams produce alternating layers of different compounds.

Torture-testing in the New Mexico desert

In the core of a research reactor, nuclear fuel rods are subjected to temperatures that melt them.

end and you produce winds of 1,200 miles per hour that slam into a test item placed in the big end. The impact is monitored to the millisecond by high-speed x-ray cameras that peer through portholes in the tube. The combined sound of the detonation and the shock wave is so great that when the 19-foot tube was first put into use some of the engineers feared it would crack a solar tower and its array of mirrors—located two miles away across the desert.

One of Sandia's major responsibilities is to test the safety of methods for transporting radioactive material across the country, be it weapons, nuclear reactor rods or what have you. For this they practice a great deal of what is called destructive testing—for example, rocketing a trailer truck bearing a radioactive waste canister at 84 miles per hour into a solid wall of cement to simulate a worst-case collision (below and opposite). "An awesome display of Newton's laws," remarked one scientist. Then suppose the canister survived such a collision (it did) but there was a fuel leak from the truck that ignited.

Ned Keltner, another mechanical engineer, explores such eventualities. "I'm involved in violent physics problems," he says. "I came here out of school 20 years ago and I was having so much fun I never left." Keltner is among those who like it hot. In a remote subcanyon there is what looks like a normal,

Rockets on the back accelerate a tractor-trailer carrying a 22-ton cask designed for shipping spent

nuclear fuel. The truck is moving at 84 miles per hour just before it slams into a concrete wall.

The blue glow is produced by charged particles moving faster than light does through the water.

everyday swimming pool except for some asbestos-covered pylons rising from its center. To test the survivability of a canister in a fire accident, Keltner floats 8,000 gallons of JP4 jet fuel on top of the water in the pool, the canister having been mounted on the pylons. When the fuel is ignited, there is an instant inferno in the desert: flames reach 125 feet, the temperature near the canister is 2,000 degrees F. The fire rages for half an hour till the fuel is exhausted.

Around the destructive testing grounds out in the desert there is a certain air of laconic and casual camaraderie. I was reminded of cowboys I once knew on a ranch: indeed, one of the engineers is Dennis Weaver's clone, right down to the accent. And like the cowboys I once knew, these men are too competent to express any particular pride in their mastery over an arcane technique. They are men who enjoy, among other things, careening in pickup trucks at breathtaking speed around the desert from one test site to another. And one suspects that destroying things on so large a scale and for a useful reason has its psychological rewards. They spend as little time as possible at the main headquarters, called Area I. Says Dave Bickel, a civil engineer who supervises the rocket tests among other things: "I hired on out here 25 years ago. Never have worked in Area I. Never have been curious about what I might have missed."

There is much to be curious about in Area I and much of it is by necessity classified. The Faustian aura of weapons is a constant if invisible presence in the thin, dry air over Area I and the installations out on the desert lands of Coyote Canyon. Sandia president George Dacey makes no bones about it. "If you freeze research in weapons ordnance," he says, "you freeze progress in such crucial matters as safety, command control and reliability."

Dacey takes pride, as well, in the spillover from weapons work and techniques into the private sector. He considers a branch of Sandia located in Livermore, California, as especially exciting. There, at the National Combustion Research Facility, scientists are endeavoring—after all these years that Man has burned fuel to propel himself here and there—to discover finally what goes on at the molecular and atomic level when gasoline burns in an automobile cylinder, still a poorly understood process.

The truck is demolished in what one physicist called an "awesome display of Newton's laws." But

the cask survived this and similar tests, including being struck by a locomotive at a grade crossing.

But nowhere is the business of producing plowshares out of swords more evident than in energy applications. In the aftermath of the 1970s energy crisis, when the call went out for alternative energy sources, Sandia engineers built the prototype of a solar tower wherein an array of mirrors focuses the sun's rays on a receptor high on a tower. The concentrated heat is stored in a conductive material—they now are using liquid salts—for conversion into electricity. Given today's energy prices, the solar tower is not especially economical but its output is nonetheless plugged into the Albuquerque grid rather than going to waste. Heeding the same call, Sandia pioneered the vertical-axis wind turbine, a device that would not seem altogether out of place in the Hirshhorn Sculpture Garden. Long, thin bowed blades attach top and bottom to a vertical rotor, thus permitting the weight of the generating machinery to be placed at the bottom rather than at the top, as in a traditional windmill-type generator. Equipment based on both of these prototypes is now in use in California and elsewhere.

Matters that seem more mundane can be simulated on Sandia's high-tech testing equipment. Out in Area III looms the free world's largest operating centrifuge (p. 135): it can subject a load of 16,000 pounds to an acceleration of 100 g's (100 times the force of gravity at the Earth's surface). An outdoor centrifuge a short distance away, although smaller in capacity, can whirl lighter loads on the end of a 35-foot-long arm. These two giant centrifuges and five smaller ones were designed to test such things as a weapon component's resilience to the enormous accelerations and decelerations in the short, violent life of a missile being launched and reentering the atmosphere.

Predicting the collapse over a coal mine

But these same machines can also be used to see what will happen on the surface above a coal mine hollowed out of the ground 300 feet below. The laws of gravity inexorably suggest that if you make an empty hole underground, eventually the roof will cave in. But, says Herb Sutherland, of the Geotechnical Engineering Division, the laws of scaling say that the pressure-loading caused by overburden on a 300-foot-deep coal mine can be simulated by making a one one-hundredth scale model of a section of the mine and its overburden and creating on the centrifuge pressure of 100 g's. Thus, by profiling the layers of material over extant or planned coal mines and other such excavations, and building scale models from actual materials, Sutherland can predict how much of the overburden will in due course collapse. This is a matter of no little concern to people whose houses lie above such mines and to the insurance companies that, in such states as

Rocket component is fired down a track to see what happens when it runs into rain at 4,000 miles an hour.

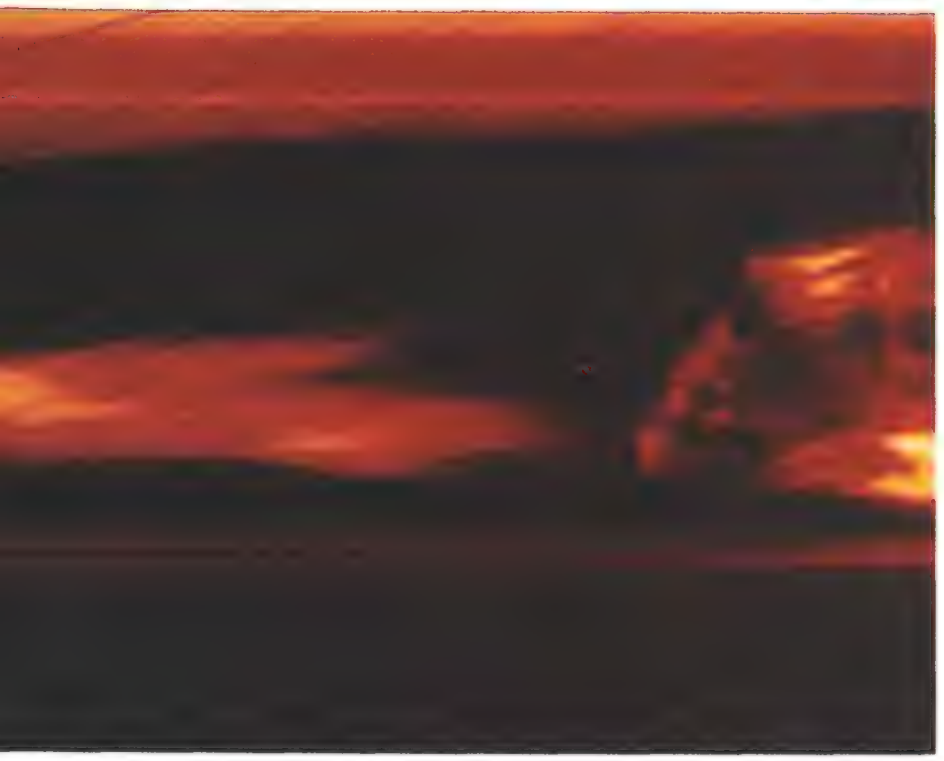
West Virginia, Pennsylvania and Illinois, demand subsidence plans from all new mining operations.

Once again, as in all such tests, centrifuge modeling leads to improved computer models which in turn can lead to improved project design. In the state of Washington, experimenters in coal gasification wanted to try burning the coal where it lay—underground—rather than hauling it up from below. Sutherland's group put a scale model on the centrifuge and from their results predicted that 30 feet of material above the proposed cavity would collapse. The test burn was carried out and 32 feet fell in.

It is well to have in mind, in considering the manifold faces of Sandia's high-tech testing facilities, an organizing principle. One such principle can be thought of as the ominous trajectory of a missile from launch to target and the series of powerful blows it might receive.

Lightning is one potential threat and in Area I there is a building full of huge Marx capacitors sunk in tanks of oil which, in combination, can produce a millisecond stroke of lightning more powerful than 99 percent of anything found in nature. Components are regularly subjected to such blasts and, standing 20 feet from this august machine behind a clear plastic curtain and with ear protectors affixed to my head, I listened to the countdown, thought I saw the instantaneous flash and jumped about four inches at the awesome clap of noise. I was pleased to note that an old hand next to me also jumped. "I always jump," he said. "Seen it a hundred times and I still jump."

A more likely threat than lightning to a speeding



A test item—the aluminum cylinder suspended from a tripod—receives a burst of artificial lightning.

missile is the radiation of various kinds mentioned before—x rays, gamma rays and so forth. Thus, Sandia has become a pioneer in what is called pulsed power—the delivery to a "target" of immensely powerful beams in infinitesimally short bursts. The scientific and engineering trick is to produce ever higher amounts of energy (in the ten-terawatt range—a terawatt being a trillion watts, more than all U.S. civilian power plants can produce) over shorter and shorter periods of time—a few billionths of a second.

A $40 million building is currently under construction where gigantic arrays of equipment, scheduled for completion in 1988, are being developed to achieve such titanic pulses. Already, smaller prototypes (one of them goes by the acronym MABE, an oddly diffident moniker in a place of such technical confidence) are producing tremendous pulses—some of which hold promise for the ultimate production of electrical power from fusion, that elusive goal that has kept moving off tantalizingly into the future as a practical source of energy, a kind of Cheshire cat. One technique for producing fusion is called inertial confinement, which is, simply stated, blasting a tiny pellet of tritium and deuterium with a tremendous pulse of energy. Both of them heavy forms of hydrogen, the deuterium and the tritium would, theory goes, fuse, producing helium, a neutron and energy, as in the sun. And one of the major stumbling blocks in a path strewn with scientific and technical obstacles has been focusing enough energy onto a small-enough target. Optical lasers have been tried with limited success so far. Particle beams seem to hold more promise, but

In room that looks like a torture chamber, components are tested for resistance to electromagnetic pulses.

Torture-testing in the New Mexico desert

focusing particles into coherent-enough beams remains a major problem.

Last year, Sandia scientists used a modified version of a focusing diode developed at Cornell and focused an intense beam of ions (charged particles) to the smallest spot size ever achieved—a target 1.3 millimeters across, or roughly the size of a pinhead. They now have high hopes that when their gigantic new Particle Beam Fusion Accelerator (PBFA II) goes on line, they will be able to use 100 trillion watts to ignite a deuterium-tritium pellet—the first major step in the exhaustingly long road to creating a sustained fusion reaction.

Until the extremely problematical dream of fusion power is realized, the chief hope for the use of atoms for peace resides in standard nuclear power, an industry that has lost virtually all its glamour over the decades and especially since the Three Mile Island (TMI) scare in 1979, when one of the two nuclear reactors not far from Harrisburg, Pennsylvania, suffered a loss-of-coolant accident. There were no casualties from the accident, but according to Jack Walker, manager of Sandia's Reactor Safety Research Department, the Nuclear Regulatory Commission (NRC) decided to determine what, if any, regulatory changes should be made in light of the "lessons learned" at TMI.

To accomplish this goal, scientists would have to look again, in much greater detail, at the probability of such accidents and at estimating their consequences. This is where Sandia comes in—the NRC commissioned the Sandia scientists and engineers to peer into simulated accidents to help provide this needed information.

Skeletonically, a light-water nuclear plant consists of rods of radioactive material in a reactor vessel; the rods produce heat that eventually makes steam to drive turbines. The reactor is housed in a containment building. If the emergency core-cooling system fails after an accident occurs, the rods can heat up rapidly —to 5,000 degrees F—and melt, the result being a meltdown in which it was feared a molten blob of radioactive material would erode through the concrete floor beneath the reactor vessel, leading to what is called the China syndrome.

But as it turns out, the China syndrome is basically a myth: Sandia scientists have found out it's what goes up, not down, that is of concern. Out on the desert, Ned Keltner of the flaming swimming pool also supervises the Large Melt Facility, where this phase of severe accidents is simulated. Here 440 pounds of depleted uranium dioxide are heated in a 250-kilowatt induction furnace to temperatures of 5,000 degrees F. "Everything turns to Silly Putty," Keltner says, and is allowed to drop onto thick round sections of concrete which simulate reactor floors.

A group headed by Dana Powers conducts another type of test that bears on the so-called China syndrome. They have shown that serious accidents may not lead to severe interactions between molten core and concrete at the bottom of the reactor. They may, instead, lead to conditions where the melt vents from the reactor vessel under high pressure. In one set of experiments, the researchers pressurized a one-tenth scale model of the reactor vessel and floor at the Zion Nuclear Plant. Molten core simulant seemed to be expelled from the vessel.

A ringside seat during a meltdown

In the nuclear test facility, Sandia's Annular Core Research Reactor, one can look down through 30 feet of water into the business end of a working nuclear-research reactor capable of a pulsed power of 35,000 megawatts (pp. 136-37). The fuel rods glow an eerie blue in this water during the countdown, then a flash occurs—too fast for the eye to fully register. Or, the reactor can run for long periods, producing tremendous amounts of heat with which to test such things as fuel rods. Elaborate devices can peer at the rods as they melt; slow-motion film later gives scientists a ringside seat from which to see how, as the temperature increases, the metal sheathing around the rods breaks down and how the molten fuel behaves. During this process, highly flammable hydrogen gas and aerosols can be produced.

At TMI, hydrogen gas leaked from the reactor vessel and burned in the containment, producing additional loads on the structure. Because of that, researchers at Sandia are trying to answer some relatively new questions. How much gas might accumulate in a containment? Would it simply burn off? Would conditions arise where it might explode? Because this last

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question is still unanswered, the NRC is requiring some plants to install igniters that would safely burn the hydrogen released in an accident.

The rationale for this arose from, among other things, the work of a soft-spoken engineer at Sandia, Martin Sherman. He and his associates operate the aptly acronymed facility called FLAME, an elongated box in Coyote Canyon where they mix varying amounts of hydrogen with air and steam to simulate the complete range of postulated accident conditions in a nuclear plant. Then they ignite the mixture to determine the conditions under which the hydrogen will burn off mildly or dangerously, or even detonate. All of this is monitored at a very considerable distance.

To demonstrate FLAME's activities for a visitor, Sherman loaded a video cassette into one of the ubiquitous cassette players at Sandia. A long-distance lens showed the long, low building brooding in the desert while Sherman explained in his mild voice the particular experiment being shown—ratios of hydrogen and so forth. There was a countdown, a sign of flame at one end of the building and instantaneously an enormous flash of fire and light at the other, with test objects being blown away like toothpicks in a tornado.

Inside the concrete tunnel, arrays of instruments fed data into computer banks while high-speed cameras recorded the event in minute detail. All this information immediately became part of human understanding of the crucially important details of using nuclear energy. And there was, as well, an altogether human reaction. As the roar subsided and a silence fell, a remote microphone picked up an anonymous voice in the desert:

"Eeeeeee-hahhhh!"

An encased explosive charge is detonated in a study of how the resultant particulate matter is dispersed. Aerial cables cross the test site, so that monitors can record the event from above as well as the side.

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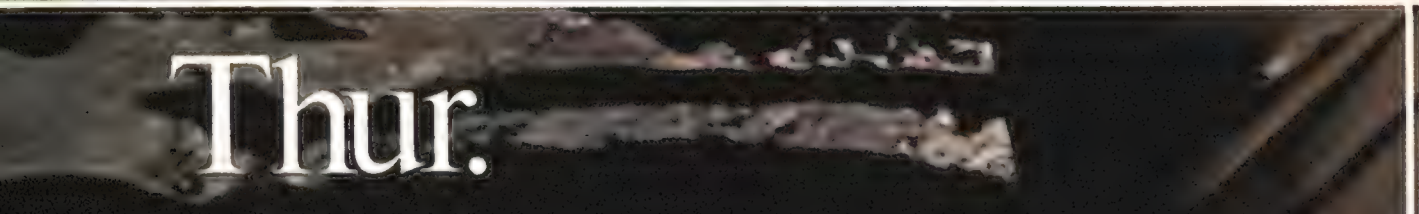

The week the Afghanistan war was closed to the press, but our reporter pressed on.

The mark of a good reporter is not simply to report a story, but to scratch for the story underneath the story.

The week of June 4, 1984, Newsweek's Patricia J. Sethi scratched and hit pay dirt.

Not only did she get an exclusive interview with Afghan President Babrak Karmal, his first with an American publication, but Sethi actually convinced Karmal to grant her an unprecedented helicopter tour of a key Soviet battle zone.

It marked the first time a Western reporter had been allowed by the government into Afghanistan to witness Soviet military operations. And Sethi's report provided the outside world with the first piece of solid evidence that the Soviets are indeed gaining ground against the Islamic guerrillas.

For Patricia Sethi, Afghanistan proved to be just one in a number of scoops she was able to capture last year.

As our U.N. bureau chief,

Sethi has used her contacts there to great advantage. On New Year's Day last year, Fidel Castro granted her his first interview with an American reporter in over five years. President Pinochet of Chile met with Sethi for his first interview with an American reporter in 10 years. And her interview with Vietnam's Prime Minister Pham Van Dong was a catalyst in the administration's efforts for the release of all Amerasian children in Vietnam.

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Newsweek

By John Garrity

Which of these men is the *real* Herbert Hoover?

Long before he became our 31st President, a young mining engineer staked a hero's claim by helping to break a Boxer siege in China

Most people picture Hoover (c. 1917) as a stiff-necked executive who lacked the boldness of a true leader.

The American Presidency as often leaves its mark on the man as vice versa and there is no crueler example than that of Herbert Hoover, a prophet of prosperity who was destined to preside over the greatest depression this country has ever seen. More than half a century after his humiliating rejection in the 1932 Presidential election, few remember Hoover as one of the towering Progressives of the Wilsonian era, as "the Great Humanitarian" who fed Europe's starving masses, or as the statesman British economist John Maynard Keynes once praised as a "weary Titan." Instead, his name is still associated with bitter memories of breadlines, soup kitchens and "Hooverville" shacks. His image remains that of an austere ideologue, a grim self-made man who posed stiffly in high collars and preached governmental restraint at a time when the nation cried out for massive federal assistance.

It is not easy now to picture a much different Hoover—a young college graduate who pushed an ore cart on the night shift in the California goldfields, for example, or a bearded mining engineer who traveled by camel across the arid wastes of Western Australia. Yet there was, in fact, such a Hoover, an intrepid adventurer who, in the words of biographer Gene Smith, "never wore a white collar, who was dirty, ate wherever he could, went down into the mines and slept on the desert floor."

In the late 1890s, an unfamiliar Hoover—handsome, dashing—went adventuring in Australia and China.

Like a pre-Hollywood adventurer, this Hoover—a ruggedly handsome fellow whose youth was camouflaged by a drooping mustache—explored northern China in search of mineral riches at the head of a long column of Chinese cavalry, orderlies, grooms, pack mules, ponies and carts. He crossed the Gobi Desert as far north as Urga (Ulan Bator), the Mongol capital, where he had an audience with the Hutuku, who was the third-ranking Lama of Tibetan Buddhism. And at the age of 25, this Hoover managed to survive a harrowing siege during China's bloody Boxer Rebellion, serving, in effect, as a civilian leader among the embattled defenders.

Few people today have even heard of the siege at Tientsin, a bustling river city located 70 miles southeast of Peking, but 85 years ago it was a major news story. During a month of heavy shelling and fanatical Boxer attacks, Bert Hoover demonstrated a capacity for valor and compassion that, by rights, should have confounded those of his critics who, years later, sought to portray him as a callous technician incapable of exercising effective leadership. He shouldered the responsibility for building barricades, fighting fires, maintaining provisions and ammunition, moving men and equipment. He ventured out into Boxer territory at night to fetch water and, time and again, he propped up the sagging morale of his beleaguered charges.

Subsequently, Hoover did not attempt to exploit his

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At 17, comely Lou Henry went camping on a burro in California. She studied geology at Stanford, married Hoover and sailed to China with him.

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heroism for personal or political gain. As a result, the Tientsin episode remains an obscure chapter in Hoover's long (he died in 1964 at the age of 90) and extraordinary career.

Modesty was a common virtue among Midwesterners of Hoover's generation and religious background. He was born in a tiny cottage in West Branch, Iowa, in 1874, one of three children of a poor Quaker blacksmith. He was orphaned at the age of eight and raised by relatives in Iowa and Oregon. He worked his way through Stanford University, graduating as a member of the new institution's first class in 1895. A capable but not brilliant student, Hoover was tall, muscular and shy. "He had mouse-colored hair, as stubbornly straight as an Indian's," one student recalled, "and hazel eyes so contemplative that they seemed dreamy." Even then, the journalist Will Irwin said of their days together at school in Palo Alto, Hoover's acquaintances "began to lean on his sane and unruffled judgment."

Hoover was trained as a geologist at Stanford and his first job after graduation was pushing a mining car for the night shift at the Reward Mine in the California goldfields. Through the sponsorship of Louis Janin, a respected San Francisco mining engineer, he then landed a job with the London firm of Bewick, Moreing and Company, managing Coolgardie, a gold mine in the desert of Western Australia. Coolgardie was a cluster of crude buildings on a waterless, treeless wasteland where the temperature held to 100 degrees at midnight and travel was by camel. So successful was Hoover at this thankless job that his British employers asked him to take on a challenging

Free-lancer John Garrity lives in Kansas City, Missouri. Many of the photographs on these pages are from the Hoovers' personal album.

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new assignment, at the then-formidable salary of $20,000 a year. His destination was China.

China's emperor, Kuang-hsü, was a young potentate who dreamed of ending decades of foreign domination by modernizing China along Western lines. The exploitation of the Celestial Kingdom's natural resources demanded a thorough exploration of the country to identify mineral deposits, and rapid development of railroads, harbors, riverways, telegraphs and mining facilities.

Hoover accepted the Chinese assignment and immediately cabled a marriage proposal to Miss Lou Henry back in Monterey, California. Lou Henry, Hoover's special friend at Stanford, was herself a geologist, a skilled horsewoman, a gifted linguist and an exceptionally self-reliant woman. She accepted Hoover's proposal and the two were married in California on February 10, 1899. On the next day, the newlyweds set sail for Peking.

The Hoovers rented a house in the International Settlement at Tientsin. This community was home to a military, diplomatic and trading community of Germans, Italians, Russians, British, Americans and Japanese. Lou Henry Hoover studied Chinese while Herbert struggled with palace intrigue in Peking.

The so-called Hundred Day Reform under Kuang-hsü had ended with his house arrest by his aunt, the Empress Dowager. It was no longer clear that Hoover had a mandate for his work, but he proceeded to explore China as few Westerners had since the days of Marco Polo. At times accompanied by Lou, he traveled by horseback with a hundred Chinese cavalrymen. In keeping with Manchu custom, his small party was preceded everywhere by heralds and followed by rear guards. (Less pomp, he was told, would involve a serious loss of face.) He visited Manchuria, and Shantung, Shansi and Shensi provinces, examining mines being milled by mules walking circles, as they had for centuries. He stood on the Great Wall, and met with warlords and Christian missionaries. Hailed as the "great foreign mandarin . . . who could see through the ground and find the gold," Hoover saw his progress retarded by throngs of villagers eager to see and touch an American. "It was impossible to push this caravan more than 20 miles a day," Hoover recalled, "so that the journey spread out interminably."

Lou Henry Hoover's occasional descents into mine shafts sometimes provoked volleys of firecrackers, wild wails and drum beating. An ancient Chinese belief, she was told, held that a wake of evil spirits trailed all women; they were not allowed to go in the mines lest catastrophe follow.

In the course of their travels, Hoover and his men discovered what he believed to be the world's largest anthracite coalfield. But in the winter and spring of 1900, Hoover began to receive disturbing reports of a violent new secret society named I-ho ch'üan, or the Mailed Fist. Westerners called the radicals "Boxers" because they practiced certain boxing rituals. "Their avowed purpose was to expel all foreigners from China," Hoover later wrote in his memoirs, "to root out every foreign thing—houses, railways, telegraphs, mines—and they included all Christian Chinese and all Chinese who had been associated with foreign things."

Mine worker hauling ore epitomized system Hoover damned as "slave labor."

Looking for minerals, Hoover (in front, white helmet) skirted the Gobi Desert.

In May, Hoover called in his mining staff and made a hasty trip to Peking to confer with Chang Yen-mao, the Director-General of Mines for Chihli Province. By the time he returned to Tientsin, armed and uniformed Boxers patrolled the streets of Peking by the thousands. On June 13, the Boxers in Peking set fire to a mission compound occupied by 200 Chinese Christian converts, "so that between sword and flames," the *North China Daily News* reported, "the whole lot of those unfortunate converts were either ruthlessly slain or burned to cinders."

In Tientsin, the foreign settlement seethed with what Hoover called "rumors and rumblings of Boxer attacks." Protected only by an estimated 1,100 sailors and marines of various nationalities—plus a force of 1,700 Russian infantrymen preparing to march to Peking—the settlement occupied a strip of land about a quarter-mile wide and a mile long beside the Pai River. It was extremely vulnerable to attack. Close to 5,000 foreign-trained Imperial troops were on hand—supposedly to offer protection from the Boxers—but on Sunday afternoon, June 17, they commenced

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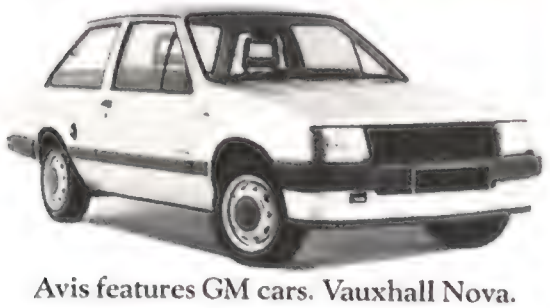

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an artillery barrage on the settlement. An alarm bell tolled frantically. Instead of attacking the almost defenseless settlement, however, the Imperial troops and a force of 25,000 Boxers held back, confusion in their ranks.

With massacre seemingly imminent, the settlement's highest-ranking foreign officer, a Russian colonel, asked Hoover and his engineers to oversee the construction of barricades. "In hunting material for barricades," Hoover wrote, "we lit upon the great godowns [warehouses] filled with sacked sugar, peanuts, rice and other grain. Soon we and other foreigners whom I enlisted had a thousand terrified Christian Chinese carrying and piling up walls of sacked grain and sugar along the exposed sides of the town and at cross streets."

The first assault came the next morning at the railway station, which, thanks to Hoover's efforts, was now heavily barricaded. Repulsed by marines and sailors at the station, the red-sashed and turbaned attackers circled and charged the opposite end of the settlement. Again they were driven back. The Boxers believed that they were invulnerable to foreign bullets, but their faith, it turned out, was badly misplaced.

Monday turned to Tuesday, Tuesday to Wednesday, and still the

Battered interior of Hoovers' Tientsin house bore effects of heavy rifle fire.

Boxers rushed the barricades, never breaching the line, but nevertheless sapping the energies of the defenders and depleting their ammunition. The Hoovers found shelter in the home of the American Commissioner of Customs, Edward Drew, whose house was shielded somewhat by surrounding warehouses. "The acute danger," according to Hoover, came from two sources, "the first the possibility of overwhelming mass attack, the second, the incessant and ferocious artillery fire." To escape the second danger, the problem "was to keep in the lee of walls" the best one could. Mrs. Hoover, he observed admiringly, "became expert in riding her bicycle close to the walls of buildings to avoid stray bullets and shells, although one day she had a tire punctured by a bullet."

Finally, on June 22, a messenger got through with a report that relief armies would arrive the following day. Indeed, the next morning the Chinese guns suddenly stopped their pounding of the settlement, while a distant cannonading indicated an engagement some miles to the south. "We climbed on the roof of the highest warehouse to get a glimpse," Hoover recalled. "We saw them coming over the plain. They were American Marines and Welsh Fusiliers. I do not remember a more satisfying musi-

Lou and Bert (top, right) entertained Stanford alumni at Tientsin before siege.

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cal performance than the bugles of the American Marines entering the settlement as they played 'There'll Be a Hot Time in the Old Town Tonight.' "

Unfortunately, the "relief armies" proved to be a mere 1,500 men. Almost immediately, the Boxers and Imperial troops attacked the settlement with renewed vigor. Their ranks had swollen to perhaps 300,000, with 80,000 Chinese troops providing support—an overwhelming superiority undermined, it was later learned, by quarreling over strategy.

"Most of us made it a business not to think or discuss the possibilities," Hoover remembered. "We did have one dreadful person who periodically wanted to know if I intended to shoot my wife first if they closed in on us." From the settlement rooftops, the occupants of Tientsin could see hundreds of corpses bobbing in the brown waters of the Pai River.

On the other side of the world, the Boxer uprising was sensational news. HERBERT C. HOOVER AND OTHER STANFORD ALUMS IN PERIL FROM BOXERS, the *San Francisco Chronicle* trumpeted. One paper went so far as to print Lou Henry Hoover's obituary. But the newspapers did not exaggerate the peril. Foreign casualties at Tientsin would be greater than those for the longer and more celebrated siege of Peking. Dispatches from that city and elsewhere—most of them grossly exaggerated—reported that the Boxers were taking no prisoners, that foreigners and foreign-tainted Chinese were being tortured, shot, decapitated and sometimes burned alive.

Chinese casualties were high at Tientsin; Allied boatmen ferried cargo of dead.

Somehow the Hoovers managed to carry on almost as if the siege were an adventure staged to further their education. The young engineer seemed absorbed in logistics, "coursing the streets at the double quick," according to one witness, "nervously jingling coins or keys in his pocket and seeming to be chewing nuts without shucking them." Once he was observed walking deep in thought while bullets were flying around him.

Kimono-clad Mrs. Hoover struck this playful pose at Japanese studio in 1901.

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His wife was equally unflappable. Frederick Palmer, the foreign correspondent, recalled the evening that an artillery shell crashed into the Hoover's house and detonated on a newel post, leaving shell fragments scattered on the floor and embedded in the walls. Fearing the worst, Palmer raced to the living room door. "I saw Mrs. Hoover in the fog of dust from disintegrated plaster keeping right on with a game of solitaire she had started, although I noted that some of the cards had been dropped on the floor by the shock. 'I do not seem to be getting this,' she said, looking up with a smile."

The defenders suppressed morbid thoughts by keeping busy. Hoover fought the endless fires, repaired barricades, and hauled food and water. At night, he and his staff, escorted by a British patrol, sneaked outside the barricades to the Municipal Water Plant, where they boiled water to be distributed each day in street-sprinkling carts. Mrs. Hoover went out daily, carrying a .38-caliber automatic Mauser pistol for protection, to manage a dairy herd and to nurse the wounded lying on the floors of an improvised hospital. "The fact that I should have been quite *willing* to have done my share of actual gunwork" does not mean that I did, she recalled later.

Hoover's efforts on behalf of the hundreds of Chinese under his care were not always appreciated by other Westerners in the settlement, who suspected the refugees of treachery. When a British navy captain named Bayly hauled some of the Chinese before a kangaroo court to be tried as traitors, Hoover was summoned to rescue them. "I rushed to the place," Hoover remembered, "to find a so-called trial going on under torchlights with Bayly, a pompous judge and various hysterical wharf-rats testifying to things that could never have taken place." Hearing that some people had already been executed on the riverbank, Hoover tried to intervene, but was ordered out by Bayly. Hoover then sped on his

Foreign influence was target of Boxer revolt, as caption of Chinese newspaper illustration made clear: "Westerners fleeing before the riot."

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bicycle to Russian headquarters and returned with a Russian platoon, which broke up the drumhead trial and turned the Chinese back over to Hoover for protection.

The trial of the Chinese reflected the tension that gripped the settlement as stifling summer heat and unceasing battle began to wear on the besieged. Smoke and heat from the many fires made matters worse, and there was the ever-present stench of death: the ground outside the barricades was littered with rotting bodies from the first Boxer charge.

The situation, though, no longer seemed quite so hopeless. By early July, an army of about 20,000 Russian, American, English and Japanese troops had fought upriver from Taku, lifting the siege long enough for the settlement's women and children and some civilian men to be evacuated by steamer. Mrs. Hoover, however, had refused to leave Tientsin despite her husband's arguments that she flee; he, in turn, would not depart until he had arranged for the safe evacuation of the Chinese refugees under his care. Afterward Mrs. Hoover wrote: "The most difficult task he had to do during the Boxer troubles . . . was to stand by these people as their lives would have been worth very little if Bert had gone away and left them alone."

Thus they were still in Tientsin on July 11 when the Boxers made their last frenzied attack along the railroad line. Driven off by a now well-armed defense force, the Boxers limped back to their camps, where many were savagely machine-gunned under orders of a vengeful general. Daybreak found the Pai River choked with not hundreds, but thousands of corpses.

In his *Memoirs* Hoover tells how he accompanied the American Marines as "a sort of guide" when the Allied Armies finally took the offensive on July 13. The plains around Tientsin were flat and treeless and this action subjected Hoover to heavy

British sailors manned a machine gun on street corner near Hoover residence.

rifle fire. "I was completely scared," he confesses, "especially when some of the Marines next to me were hit. I was unarmed and I could scarcely make my feet move forward." True to his strict Quaker upbringing, Hoover had survived 28 days of pitched battle without ever carrying a weapon, but now his confidence was shaken. "I asked the officer I was accompanying if I could have a rifle. He produced one from a wounded Marine, and at once I experienced a curious psychological change for I was no longer scared, although I never fired a shot. I can recommend that men carry weapons when they go into battle—it is a great comfort."

Of even greater comfort was the fact that the attack, the climactic event of the entire ordeal, was successful. The Boxers were scattered and the siege of Tientsin was lifted. There was no band playing "There'll Be a Hot Time in the Old Town Tonight," but there was music in the one-word cable that Hoover sent to his father-in-law, Charles Henry, at Monterey, California: SAFE.

Soon after the siege ended, Hoover plunged back into his mining career and it was not long before his reputation and fortune were secure. In a tough, critical profession, one biographer wrote, "Hoover was an incandescent name." By the time he was 40, he was widely regarded as the greatest

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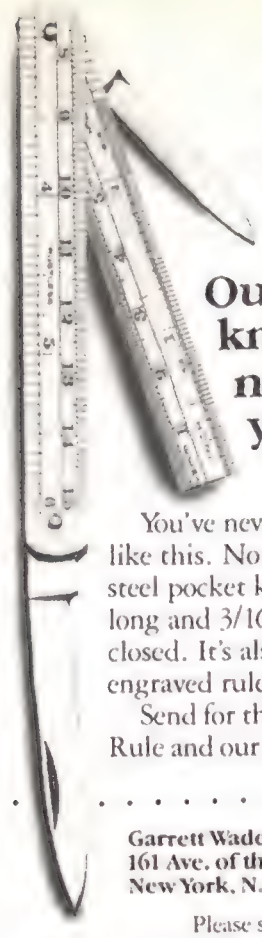

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mining engineer and administrator in the business. First as a partner with Bewick, Moreing and Company, later as an independent consultant, he helped start up new enterprises and resuscitate old ones. Perhaps a million men were employed in Hoover mining projects that stretched from Canada to Australia, from Russia and Europe to the Middle East and Burma. He girdled the globe eight or ten times, nonchalantly maintaining a hectic pace that would have killed many a lesser man. For his troubles, he was billed as "the highest-paid man of his age in the world."

With the outbreak of World War I, Hoover made a spectacular transition from business to public life. He administered the Belgian Relief Commission to feed the hungry and sick in occupied Belgium. He directed the post-war European food relief program and accompanied President Woodrow Wilson to the Paris Peace Conference. As Secretary of Commerce under both Warren G. Harding and Calvin Coolidge, Hoover was effusively praised as the most dynamic and brilliant Cabinet member of his time.

Not until after he achieved the highest office in the land did the great engineer taste the bitter ashes of defeat. As President of a nation beset with seemingly insurmountable economic difficulties, Hoover time and again called upon Americans to summon the same unselfish sense of an imperiled community that had worked a miracle in China three decades earlier. Increasingly, however, Hoover was perceived as an uncaring man who would not lead the country out of the Depression. To his everlasting dismay, the survivor of Tientsin found himself trapped in yet another siege and it was one that did not end until he was turned out of office, perhaps the most vilified President in history. But he still had plenty of loyal supporters at his beloved alma mater.

The night that he conceded defeat, a group of Stanford students demonstrated outside the Hoovers' Palo Alto home. While he and Mrs. Hoover stood on the terrace, the young people sang college songs. Smoke from flares swirled up into the sky. After one final cheer, Herbert Clark Hoover thanked the crowd and turned away. "It would not have been like him," the historian Gene Smith observes, "to let them see the tears running down his face."

A jaunty survivor, Lou Henry Hoover—who had carried a pistol and was dubbed "Captain of the Guard"—stood beside one of the siege guns.

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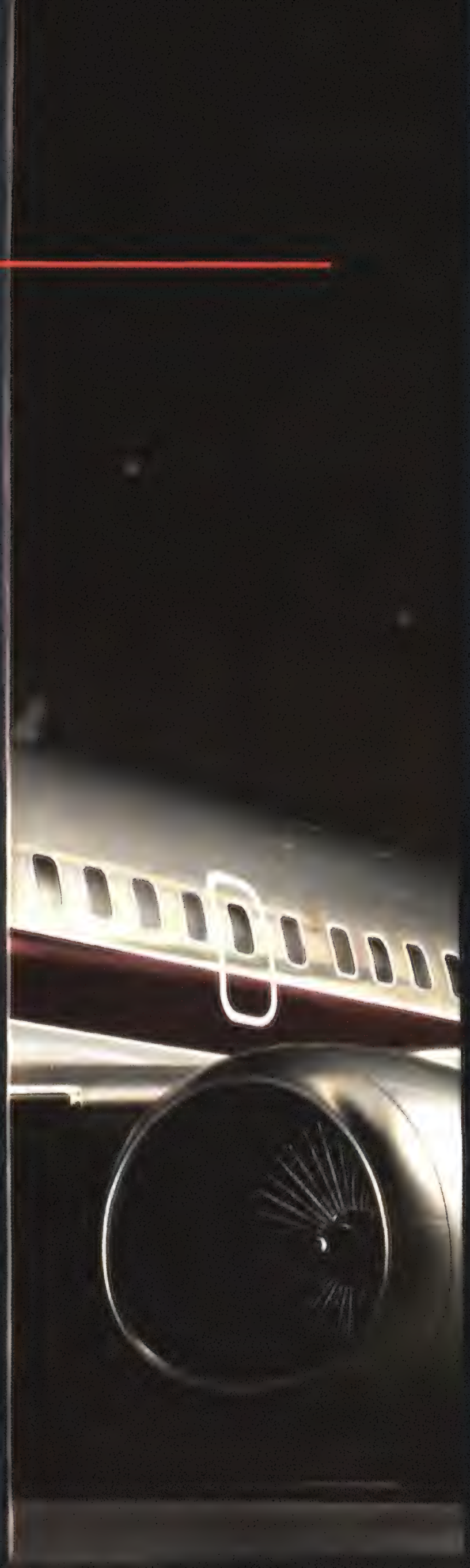

Book reviews

All the Olympians: A Biographical Portrait of the Irish Literary Renaissance
Ulick O'Connor
Atheneum, $18.95

Lady Gregory: The Woman Behind the Irish Renaissance
Mary Lou Kohfeldt
Atheneum, $19.95

Between the 1890s and 1920s Ireland experienced an extraordinary literary and cultural revival which still excites our imaginations today. Why did it come about? The answer, of course, is that we do not really know. Periods of great creativity blossom unexpectedly from time to time in history, defying rational explanation, but there can be no doubt that the Irish renaissance will always be regarded as one of the most fascinating episodes in the annals of European literature.

A curious aspect of the Celtic revival (as it was sometimes called) is that the chief figures involved were an unusually diverse group: Edward Martyn was an eccentric aristocrat who led a semimonastic existence in a Gothic castle; George Moore was a cosmopolitan novelist of shifting allegiances, alternately adoring and hating the Irish; Douglas Hyde was an upper-class folklorist who wanted to "de-anglicise" Ireland by recovering traditional legends and reviving the Irish language; James Joyce was a permanent exile who could make peace with his native land only by living abroad; J. M. Synge was a gifted playwright who had to travel from Paris to the Aran Isles, off the western coast of Ireland, in order to discover his cultural identity; and W. B. Yeats (right) was the one genius in the movement, always uneasy in his relationship with Irish political causes.

There were many others—actors and actresses, publishers, collectors of old ballads, politicians, painters, musicians —for the Irish renaissance was a self-consciously egalitarian affair that touched everyone from the landed gentry to the impoverished peasants. Ulick O'Connor, in *All the Olympians*, has supplied a lively, anecdotal guide to the numerous personalities involved. Though his account is occasionally confusing because so many Irishmen and women pop in and out of the narrative, the effect of the book in the end is to produce a glittering mosaic of this astonishing cultural epoch.

Like some other revolutions, this one began at the top rather than the bottom. Many of the writers and artists who lent distinction to Irish life were members of —or closely associated with—the ruling class, the Anglo-Irish. Though resident for centuries in Ireland, the Anglo-Irish tended to cut themselves off from their fellow countrymen and lived in isolated splendor in their grand country houses; they liked to think of themselves as Englishmen stranded in a potentially dangerous colony.

It was one such aristocrat who found herself at the very center of the agitation for Irish cultural independence. The story of her remarkable life has now been told in a detailed scholarly biography by Mary Lou Kohfeldt, and a curious story it is indeed. The plain daughter of a Protestant landlord in the west of Ireland, Augusta Persse, to the surprise of her family, made a real matrimonial catch: Sir William Gregory, the wealthy and influential owner of nearby Coole Park. The marriage gave her an established social position but temporarily inhibited her enthusiasm for Irish nationalism.

After Sir William's death in 1892, Lady Gregory's former passion for Irish culture revived. With the encouragement of Yeats, she learned Gaelic and began to collect the stories, songs and legends of the tenants on her estate. Soon she was going farther afield, especially to the Aran Isles, where the old Irish way of life survived intact, unsullied by English influences. Lady Gregory compiled several volumes of traditional Celtic lore and later also distinguished herself as a playwright and as one of the founders of the Abbey Theatre in Dublin.

But her supreme claim to historical importance lies in the fact that Coole, her country house, became the unofficial headquarters for the Irish writers of her day, especially Yeats. There, in a setting of great peace and beauty, they could argue eloquently far into the night, with the benevolent, aristocratic lady always hovering about to offer opinions or attend to their needs. Lady Gregory was, in fact, the chief patron of the movement. "I

W. B. Yeats, here reading in 1894, was "Willie" to Lady Gregory. At Coole she "offered him care, comfort, order, and stability."

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doubt I should have done much with my life but for her firmness and care," said Yeats; many of his contemporaries echoed that sentiment. And in poems like "The Wild Swans at Coole" and "Coole Park and Ballylee 1931," Yeats conferred immortality upon that wonderful house and its generous owner.

William S. Peterson
Professor of English
University of Maryland

Ambrose Bierce: The Making of a Misanthrope
Richard Saunders
Chronicle Books, $7.95 paper

The Complete Stories of Ambrose Bierce
Edited by Ernest Jerome Hopkins
University of Nebraska Press,
$10.95 paper

During the Gilded Age, Ambrose Bierce, the man with the question-mark death, held sway as literary dragon of San Francisco. If he liked your writing—and, equally important, your deference to him—he would plump for it with all of his influential energy. If he didn't like it, Lord help you. He once savaged a work in a single line: "The covers of this book are too far apart." His public criticism of a young poet's fledgling efforts drove the fellow to suicide.

His favorite targets, though, were not smarmy poets but greedy plutocrats. In his column for the Hearst chain, he regularly referred to Leland Stanford as "Stealand Landford" and "£eland $tanford." When the Southern Pacific's Collis P. Huntington and other "railrogues" tried to persuade Congress that their $75-million debt should be converted to low-interest bonds maturing in 83 years, Bierce moved to Washington and went into action. He wrote editorials, attended hearings and lobbied against the railroad faction until he was exhausted.

One of the great moments of Bierce's, or any newsman's, life came the day he and Huntington happened to meet on the Capitol steps. Huntington offered Bierce various sums to drop his crusade. Bierce refused each offer.

"Well, name your price," Huntington insisted. "Every man has his price."

"My price," Bierce replied, "is $75 million . . . to be handed the Treasurer of the United States."

By dint of Bierce's barbed journalism, Huntington and his cohorts were beaten. Congress rejected his bailout bill in 1896 and later passed a measure requiring repayment of the debt in ten years at six percent interest.

But there was a dark side to Bierce's righteous anger—an acerbic insecurity that poisoned his private life. He had a habit of "disintroducing" himself to friends and acquaintances he felt had wronged him. He broke with his wife when, after years of his neglect, she received love letters from an admirer. His two sons died young, one of them, disappointed in love, a suicide.

Having a flawed imagination, he wrote no sustained work of value. He denigrated novels because, since they can't be read through at a single sitting, they allegedly fail to evoke in the reader a sense of unified artistry—undoubtedly a case of sour literary grapes. Lacking sympathy, he was unable to create well-rounded characters. His best work came in short bursts: ingeniously plotted, cinematically vivid stories and the cynically witty definitions that were gathered in *The Devil's Dictionary* ("*impiety*, n. your irreverence toward my deity"; "*peace*, n. in international affairs, a period of cheating between two periods of fighting").

His most striking stories center on a subject matter virtually unique in fiction: the awareness of imminent violent death. Perhaps borrowing from his experience of being gravely wounded in the Civil War, he wrote upward of a dozen stories in which the protagonist knows he is about to die, usually by hanging or firing squad—or, in a variation, recovers consciousness after being pronounced dead. The most famous of these tales in the midst of death is "An Occurrence at Owl Creek Bridge"; the best, to my mind, are the incisive "Parker Adderson, Philosopher" and the astonishingly compact "One Summer Night." (Unfortunately, the University of Nebraska's new "complete" stories volume does not include "One Summer Night"; it can be found in *The Collected Writings of Ambrose Bierce* published by Citadel Press.)

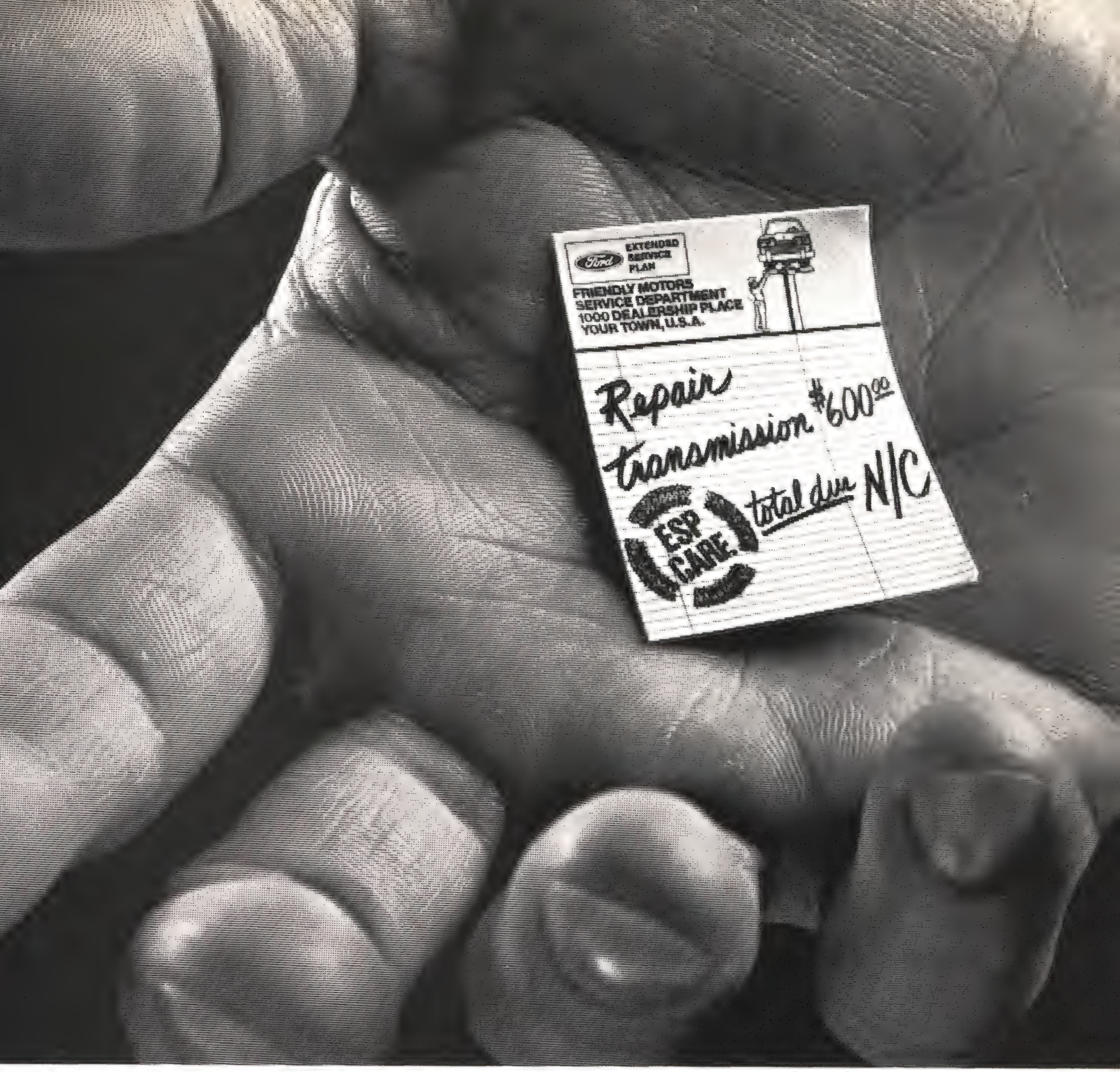
Although *Ambrose Bierce: The Making of a Misanthrope* is a deft, readable introduction to the man's life and work, its subtitle is a misnomer. Richard Saunders does not explain what made Bierce so ill-tempered, but then I'm not sure anyone can. The motivation for his truculence is as murky as the facts of his death. He was last heard from in December 1913 in a letter postmarked Chihuahua City. He was 71, making his way toward Ojinaga, where he planned to attach himself to Pancho Villa's makeshift army as an observer of the Mexican Revolution. It's as if he just stepped inside a dust devil and disappeared. Bierce loved ending stories with a chilling surprise; his own "nondeath" provides the ultimate frisson.

Political cartoon captured Bierce's ferocious opposition to railroad bloc.

Dennis Drabelle
Washington attorney and writer

The Flower and the Leaf: A Contemporary Record of American Writing Since 1941
Malcolm Cowley
Edited by Donald W. Faulkner
Viking, $25

Malcolm Cowley has been a presence in American literature for the best part of this century. Although his stay in France in the 1920s was brief, he is identified with the expatriate writers of that decade because *Exile's Return*, his most widely read book, has become one of the standard works on the American writers of the period. In the 1930s, as an editor at the *New Republic*, he was at the center (left of center) of literary and political controversies of that time. For much of the past 40 years he has been a literary consultant for Viking, an occasional teacher and a free-lance critic and essayist. He has, as the title of one of his books says, "worked at the writer's trade."



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A literary journalist rather than an academic critic (he takes a few gentle pokes at professors), Cowley is most comfortable with the book review or the short essay. Most of his books are collections of his magazine pieces, given a semblance of unity by an overriding subject matter or a shared period of time. Sometimes he works with an editor who presumably chooses what is to be reprinted—as Donald W. Faulkner has done for *The Flower and the Leaf*—and Cowley often reworks the selections for style or to erase obvious traces of the original occasion for the pieces. As he once said, "I hate to write and love to revise."

The Flower and the Leaf brings together pieces written between 1941 and 1982, most of them reprinted from the *New Republic* or the *New York Times Book Review*. The subtitle, *A Contemporary Record of American Writing Since 1941*, is misleading; writers who made their reputations after World War II appear only peripherally. John Cheever is the single exception, but even in his case Cowley sees the postwar novelist through the young writer (Cheever was 18 years old), whom he first met in 1930.

The key to the book is Cowley's poem that gives *The Flower and the Leaf* its title. The poet recalls the men with whom he was young in the 1920s, and aside from the poem's lament for losses, it provides a proper epigraph for this book. There are a few essays on earlier American writers (Hawthorne, Whitman) and some on the postwar publishing scene, but most of the selections deal with writers who are—give or take a decade—Cowley's contemporaries. Perhaps *A Contemporary Record of the Survival of Prewar Writers After 1941* would have been a better subtitle.

The real unity of the book is Cowley's voice. What he says about the writers he discusses might be said about him. He celebrates literature in its social context. One of the "chief duties" of writers is to make "an effort toward intellectual and emotional understanding of what was happening in the world," he said in 1943, and this view of the writer in relationship to his society is Cowley's own sense of his position in both the literary and the larger worlds.

Cowley has "worked at the writer's trade."

Commenting on Whitman's additions to the lean, clean first version of *Leaves of Grass*, Cowley says that he violates "an older literary convention, that of simply being considerate of one's readers." Consideration, for Cowley, does not mean being condescending in subject matter, but being clear and precise in the presen-

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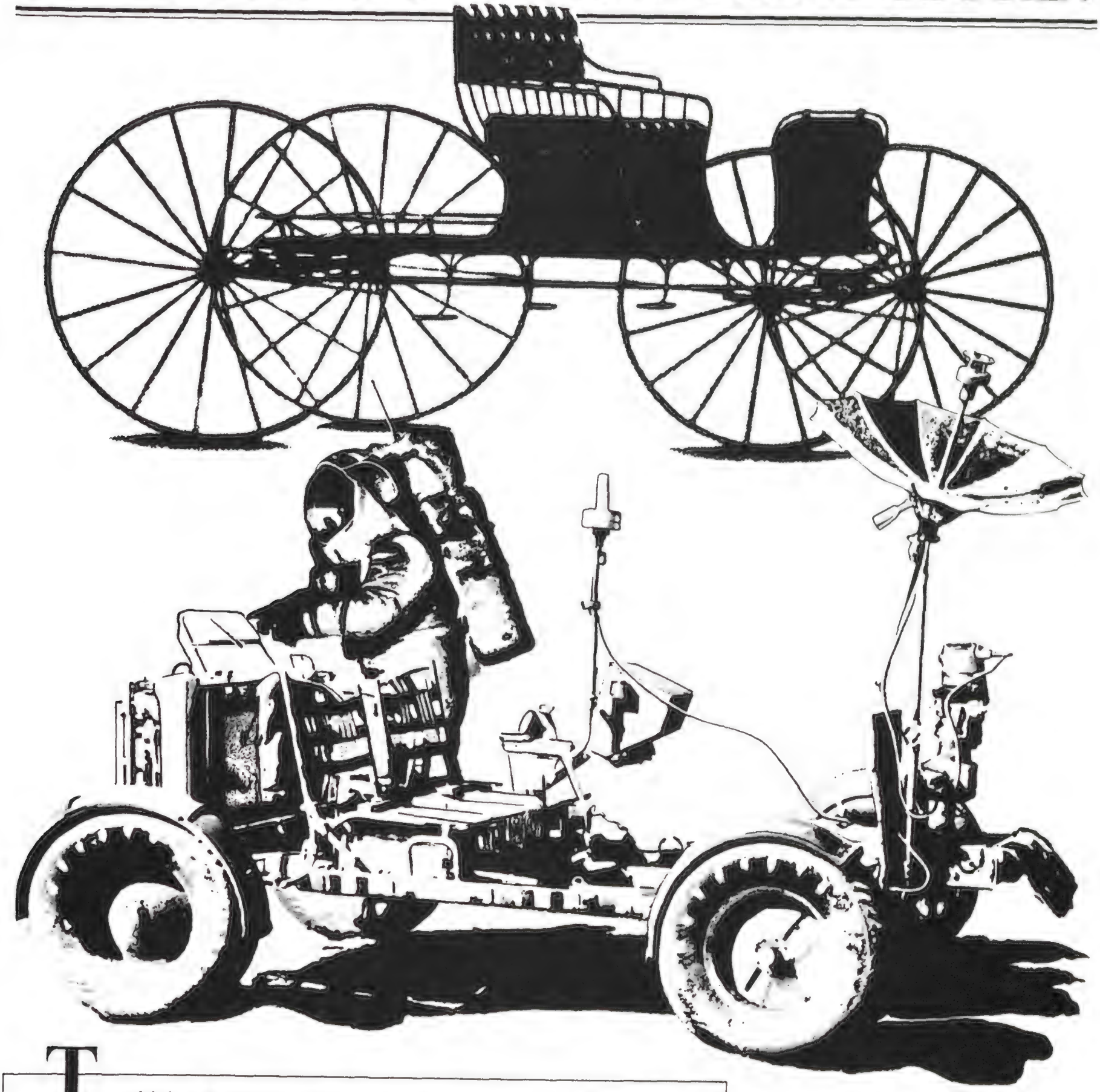

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tation of his material. In a funny piece on the jargon of sociology, Cowley suggests that current sociological writing is "deliberately calculated to frighten away the intelligent but unspecialized reader." That is Cowley's own chosen audience, and all of the material in the book, even the briefest review, is designed to serve, interest and amuse precisely that kind of reader.

The opening sentence of this review might disconcert Cowley. There is something too august about a word like *presence*. I once heard Cowley sing "Ten Cents a Dance," and somewhere behind the author's prose I can hear that wonderful gravelly voice of his. "A poet's conduct and his work are two ways of expressing the same habits of thinking," he said of Whitman. Cowley the man is finally indistinguishable from Cowley the writer and it is this combination that—even when one disagrees with Cowley the critic—makes *The Flower and the Leaf* a pleasure to read.

Gerald Weales
Professor of English
University of Pennsylvania

Matisse
Pierre Schneider
Translated by Michael Taylor and
Bridget Strevens Romer
Rizzoli, $95

On those special occasions when a book results from years of devotion, even obsession, on the part of its author, the reader is privileged (if the result is this accomplished) to share the richness of the writer's experience. Pierre Schneider's *Matisse* is the fruit of 14 years of study.

At the turn of the century, a Parisian critic appropriately labeled the intensely colored canvases painted by Matisse and his colleagues the work of *fauves*, or wild beasts. Today, Matisse's best paintings still evoke the energy, vitality and freshness that so stunned his audiences then. The sensuousness of his line and color suggest what may have provoked the vice commission of the Illinois legislature to investigate his works when the notorious International Exhibition of Modern Art visited Chicago after its debut in New York as the Armory Show in 1913. Even the works Matisse painted later, in the relative calm of middle age, retain his love of decorative patterning and playful eroticism—as do his cutouts.

Schneider explores at length Matisse's sources of inspiration: Islamic, Japanese and Byzantine art, as well as the French painters Redon, Cézanne, Signac, Gauguin and, especially, the uncluttered, simplified compositions of Pierre Puvis de Chavannes. Matisse discovered, among other things, that "The Orientals had made color a means of expression." Through excellent color reproductions, we can follow Matisse's experiments with color from his early somber canvases to his emulation of Signac's Pointillism to the development of his own bold palette where a green line painted down Madame Matisse's face in a 1905 portrait fiercely announces that color in his painting has a life of its own.

While not biographical, this hefty volume offers much detail about Matisse's life and personality, often quoting from the artist's letters as well as from a variety of interviews and memoirs. We learn, for example, of his great enthusiasm, discovered on his visit to Moscow in 1911, for

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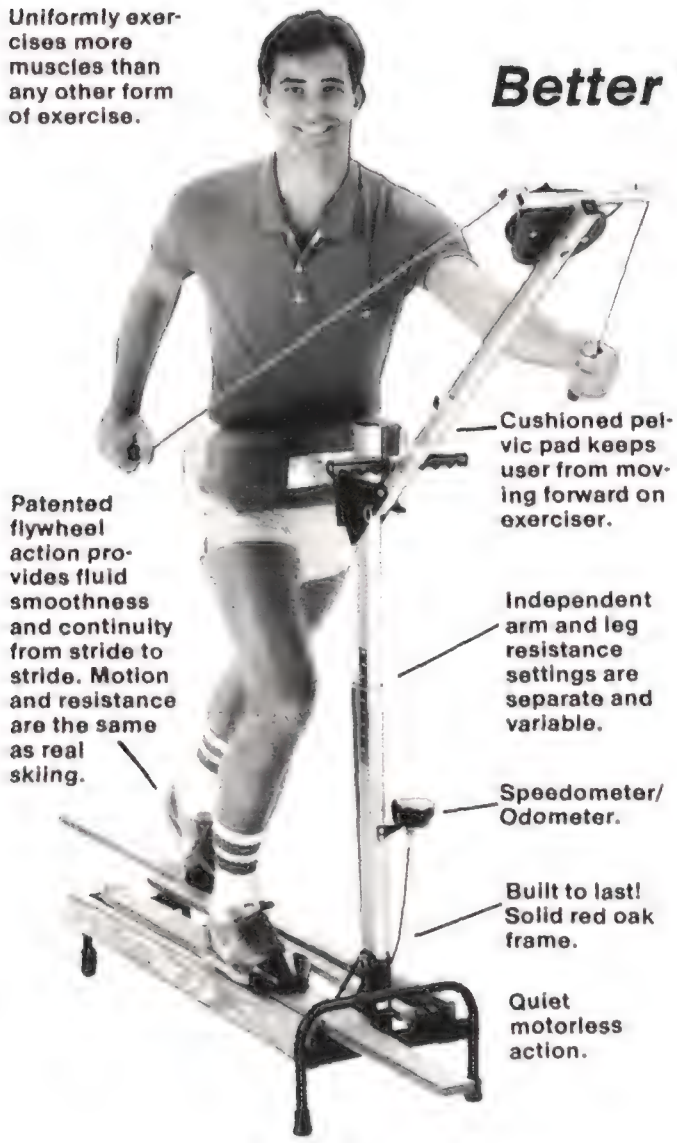
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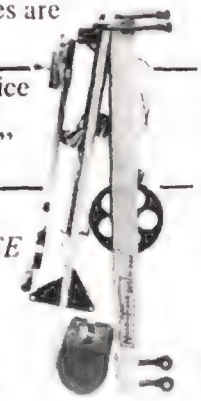

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Russian icons. Matisse described the icons as "primitive art . . . authentic popular art," and insisted: "The modern artist should derive his inspiration from these primitives." Schneider constantly stresses Matisse's interest in the sacred, which the artist interprets as necessary to achieve the decorative.

Matisse stressed to his students: "It is not physical matter one renders but human emotion." And he wrote to Gertrude Stein from Tangier in 1912: "Painting is always very hard for me—always this struggle." This was during the first of the two winters that Matisse spent in Morocco, where he found, momentarily, "a paradise of painters." Yet despite the wonderful soft light and the exotic subjects he discovered there, he chose not to return for a third stay, electing instead to endure the harsh winter weather in Paris. According to Schneider, Matisse feared that familiarity would ruin the earthly paradise he had discovered in Morocco.

During the 1940s and until his death in 1954, Matisse, living in the South of France, suffered from ill health. Remarkably, this is the period when he produced some of his greatest works—the illustrations for the book *Jazz*, the Chapel of the Rosary at Vence, and the large cutouts. Though vastly different from his early Fauvist paintings in appearance, Matisse claimed that in his cutouts he had "looked for the same things . . . perhaps realized by different means." In all, he celebrated light and space.

This is an enormous, impressive tome featuring 930 illustrations of which 220 are in color. Many are reproduced for the first time. Its organization is atypical, not chronological but thematic. While this approach makes the volume anything but a handy reference book, it offers new insights and interesting juxtapositions. It is the most important book on the artist since Alfred Barr published his monograph *Matisse: His Art and His Public* in 1951. Anyone who loves Matisse and modern art will not only want to read Schneider's magnum opus, but will insist on possessing it, in order to revel in its intricacies slowly over time, the way it was written.

Gail Levin

Art historian, author of *Edward Hopper*

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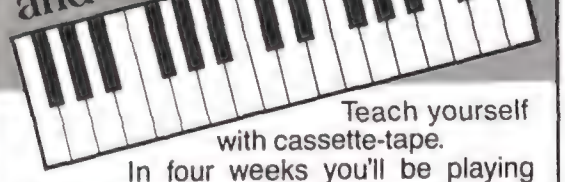

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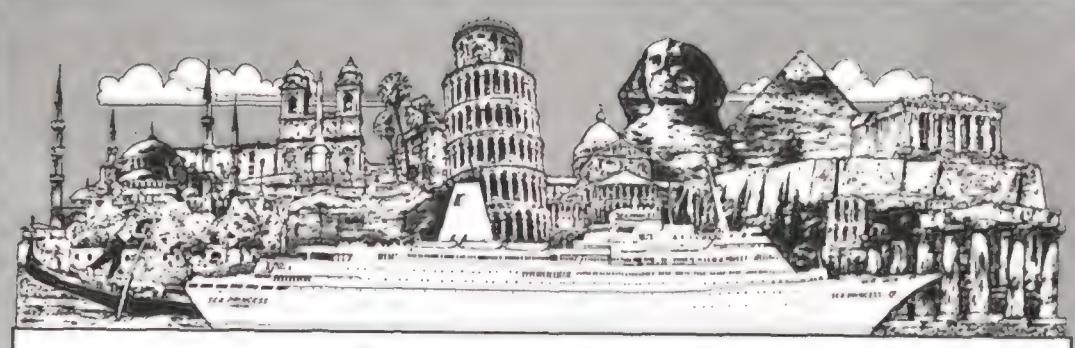

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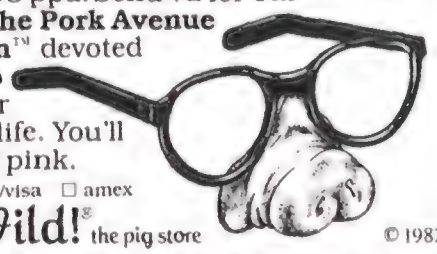

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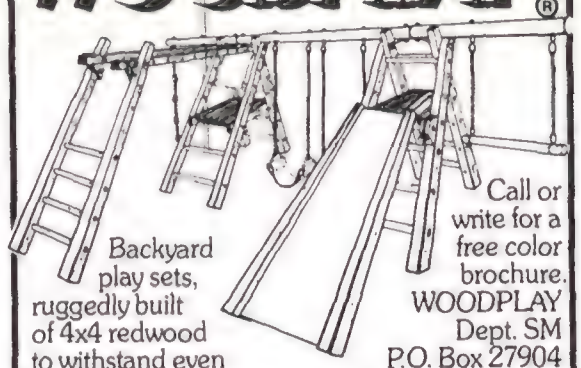

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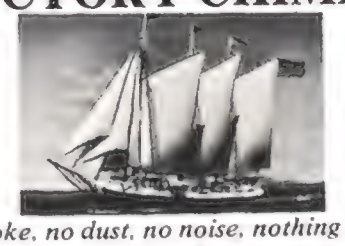

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National Portrait Gallery
A Truthful Likeness: Chester Harding and His Portraits (through September 2).
William Edward West: Kentucky Painter (through June 16).
Walt Whitman: Liberal and Lusty as Nature (May 31, June 1; 7:30 P.M.) Portrait in Motion; call 357-3030.

National Museum of Natural History
Mammals in the Limelight (new permanent exhibit in the museum's fossil halls) With large murals and mounted skeletons, it depicts evolution of North American mammals.
The Shahsavan Nomads of Iran (May 10; noon, Baird Auditorium) Film by Arlene Dallalfar.

Hirshhorn Museum & Sculpture Garden
Free Film Series (Thursdays, Fridays and Saturdays from May 2 through May 30) Documentaries on artists including Sam Gilliam, Alex Katz, Lewis Hine; children's films. Call 357-2700 for schedule.

National Museum of American Art
Lithographs of James McNeill Whistler (May 3-August 18).
Architecture in Silver (May 3-July 28) Silver tea and coffee services designed by 11 architects.
Recent Acquisitions: Prints, Drawings and Watercolors (May 17-October 20).

Freer Gallery of Art
The Arts of South Asia (May 14-November 30) Painting and sculpture representing a complete survey of museum's collections from the Indian subcontinent.

National Museum of African Art
Reliquary Cults of Gabon and Beyond (May 27; 7 P.M.) Lecture by Dr. Arthur Bourgeois; galleries open at 6 P.M.
Free Film Series (May 1, 8; 7 P.M.) Four films by acclaimed British ethnographic filmmaker Francis Speed, including *Sons of the Moon*. Call 287-3490 for details.

National Museum of American History
Celestial Images: Astronomical Charts, 1500-1900 (May 16-August 23).
Al Jolson (May 3-July 11) Small exhibit.

Cooper-Hewitt Museum (New York)
Timeless Sources: Rare Books in the Cooper-Hewitt Museum (May 21-October 6) Books from 15th through 20th centuries on natural history, ornament, architecture, textiles and many other topics.
Chicago Furniture: Art, Craft and Industry, 1833-1983 (May 21-August 25).

Renwick Gallery
Material Evidence: New Color Techniques in Handmade Furniture (May 17-September 22) New medium for woodworkers. See *Highlights continued.*

National Air and Space Museum
Edward Henry Heinemann and Clarence "Kelly" Johnson: Designers for the Jet Age (through April 1986).
Aviation Progress and the Human Spirit (May 23; 8 P.M.) Lecture by Donald D. Engen.
Poetry in Motion: The Thunderbirds (May 9; 7:30 P.M.) Air Force precision flying team presents film.
The Realm of the Galaxies (May 4; 10 A.M.) Monthly sky lecture.

Exhibition catalogs

Catalogs available at this time include:
Baseball Immortals (paper, $4.95)
African Masterpieces from the Musée de l'Homme (paper, $19.50)
Creation and Renewal: Views of Cotopaxi by Frederic Edwin Church (paper, $14.95)
William Edward West: Kentucky Painter (paper, $15.95)
Joseph Wright, American Artist (1756-1793) (paper, $8.95)
Material Evidence: New Color Techniques in Handmade Furniture (paper, $5)

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Radio Smithsonian: features on this weekly half-hour series include a comparison of African tribal art with the works of European artists, the effect of electricity on rural America, and a sampling of Hispanic tales and Appalachian stories.
Smithsonian Galaxy: short radio features explore intriguing aspects of history, science, art and more.
Here at the Smithsonian . . .: two-minute features include the latest in gamma-ray astronomy and a look at the Smithsonian's vast orchid collection.
Smithsonian World: "A Usable Past," hour special on PBS TV, May 29, 9 P.M., visits Smithsonian Treasures in Edinburgh, interviews Miriam Rothschild.

To find out what stations in your area carry these radio and TV programs, write: Office of Telecommunications, MNH Room C222B, Washington, D.C. 20560.

Resident Associate events

To become a Resident Associate, or to find out about the many activities presented monthly, or for fee and ticket information, call 357-3030. Here are some May events:
A Tribute to Count Basie Starring Joe Williams (May 5; 7:30 P.M.) Concert.
Miles to Go (May 7; 8 P.M.) Documentary about the wilderness experiences of eight women.
Just So Stories (May 7-June 8) Masked performers and puppets of Mermaid Theatre of Nova Scotia, in Discovery Theater.
The Smithson String Quartet (May 7, 8; 8 P.M.) Ensemble is joined by guest artists Sara Stern, flute, and Dotian Carter, harp, to play French music by Maurice Ravel and Claude Debussy.
The Emerson String Quartet (May 11, 7 P.M.; May 12, 6 P.M.) Music of Maurice Ravel and Claude Debussy.
Film Masterpieces from Eastern Europe (May 14, 21, 28; 7 P.M.) New films, many of them Washington premières.
Mysteries of Easter Island (May 15; 8 P.M.) Lecture.
Dancers' Choice (May 17; 8 P.M.) Tish Carter, Nancy Galeota and Jan Van Dyke offer contemporary program.
Ragtime Plus! (May 19; 11 A.M.) Charles Lindsay Foreman presents program of rollicking popular and "classical" rags.
Storytelling Festival (May 21; 7:30 P.M.) Tales from around the world.
Saxophone Badness (May 29; 7 P.M.) Allen Houser Sextet plays favorites of Charlie Parker and Cannonball Adderley.
Conceiving and Creating Aditi (June 5; 8 P.M.) Designer of major Festival of India exhibition discusses its background.

National Associates Lecture and Seminar Program

In an effort to share the treasures of the Institution with members and the public throughout the world, the Lecture and Seminar Program will inaugurate its first international lecture series in Tokyo, May 14-18. The new program brings to Japan distinguished Smithsonian curators and scientists to speak both to Americans living in Tokyo and to the Japanese public.

Speakers for this series will include Smithsonian Secretary Robert McC. Adams; Richard Fiske, director, NMNH; Walter Boyne, director, NASM; Marc Pachter, director for history and public programs, NPG; Barbara Shissler Nosanow, assistant director for museum programs, NMAA; Clyde Roper, chairman, Department of Invertebrate Zoology, NMNH; Douglas Ubelaker, curator, Department of Anthropology, NMNH; and Charlene James-Duguid, program manager, Smithsonian National Associates Lecture and Seminar Program. For invitations and further information, write: Lecture and Seminar Program, A&I 1190, Smithsonian Institution, Washington, D.C. 20560.

Smithsonian Institution Traveling Exhibition Service

SITES circulates exhibitions to hundreds of cities outside Washington. To sponsor a show in your community, write: SITES, Smithsonian Institution, Washington, D.C. 20560. Here are some May exhibits:

Los Angeles (May 11-July 21) *Yesterday's Tomorrows: Past Visions of the American Future,* California Museum of Science and Industry.

Ft. Lauderdale (May 25-July 7) *Sculpture: Exploring Three Dimensions,* Discovery Center.

Boston (May 11-June 9) *Perfect in Her Place: Women at Work in Industrial America,* Wentworth Institute.

Lincoln, Nebraska (May 11-June 9) *Images of China: East and West,* University of Nebraska.

Dallas (May 4-June 2) *Buildings Reborn: New Uses, Old Places,* Meadows Building, Wilson Associates.

Visiting members' benefits

The cordial welcome at the Associates' Reception Desk, 10 A.M. to 4 P.M. daily, in the Smithsonian castle, includes special orientation materials in a handy Associates' bag, and details on dining in The Court and discounts in Smithsonian museum shops.

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Furniture with panache

At first glance, it looks like a neoclassical table—sort of (bottom, center). But the colors—pink, green, yellow, lavender—are all wrong. And the stately piece next to it (bottom, left) resembles a Victorian hall chair, but with its vivid patterns you might expect to find it in the Yellow Submarine. These two works, and 17 others, are what result when you ask 19 of the country's finest woodworkers to create "furniture d'art" using Colorcore, a new Formica laminate notable for its color possibilities.

"Material Evidence: New Color Techniques in Handmade Furniture," an undertaking of the Gallery at Workbench in New York City with help from Formica Corporation, has just begun a two-year SITES tour. It will be on view at the Renwick Gallery until September 22; later stops will include Kutztown, Pennsylvania; Midland, Michigan; and Little Rock, Arkansas.

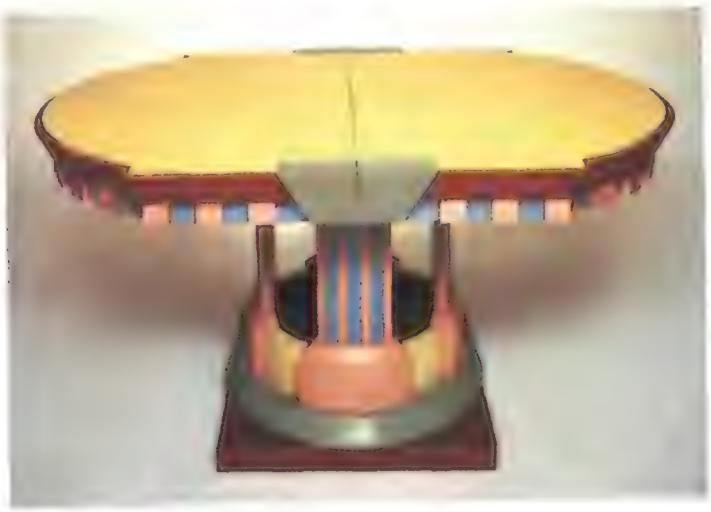
Inspired, the woodworkers used the new material in unexpected ways. The back of Mitch Ryerson's Victorian hall piece, for example, is a lattice of woven laminate strips, while John Cederquist created a trompe l'oeil facade for his Art Deco chest of drawers (bottom, right). Nearly every piece is a witty play on past styles: high-tech Colorcore seems to have propelled furniture makers from tongue-and-groove to tongue-in-cheek.

Constance Bond

Silk-streamered pole crowns Jack Larimore's leather-upholstered chair.

Jay Stanger's *Dress Her* liquor cabinet has evocative lines when closed, but . . .

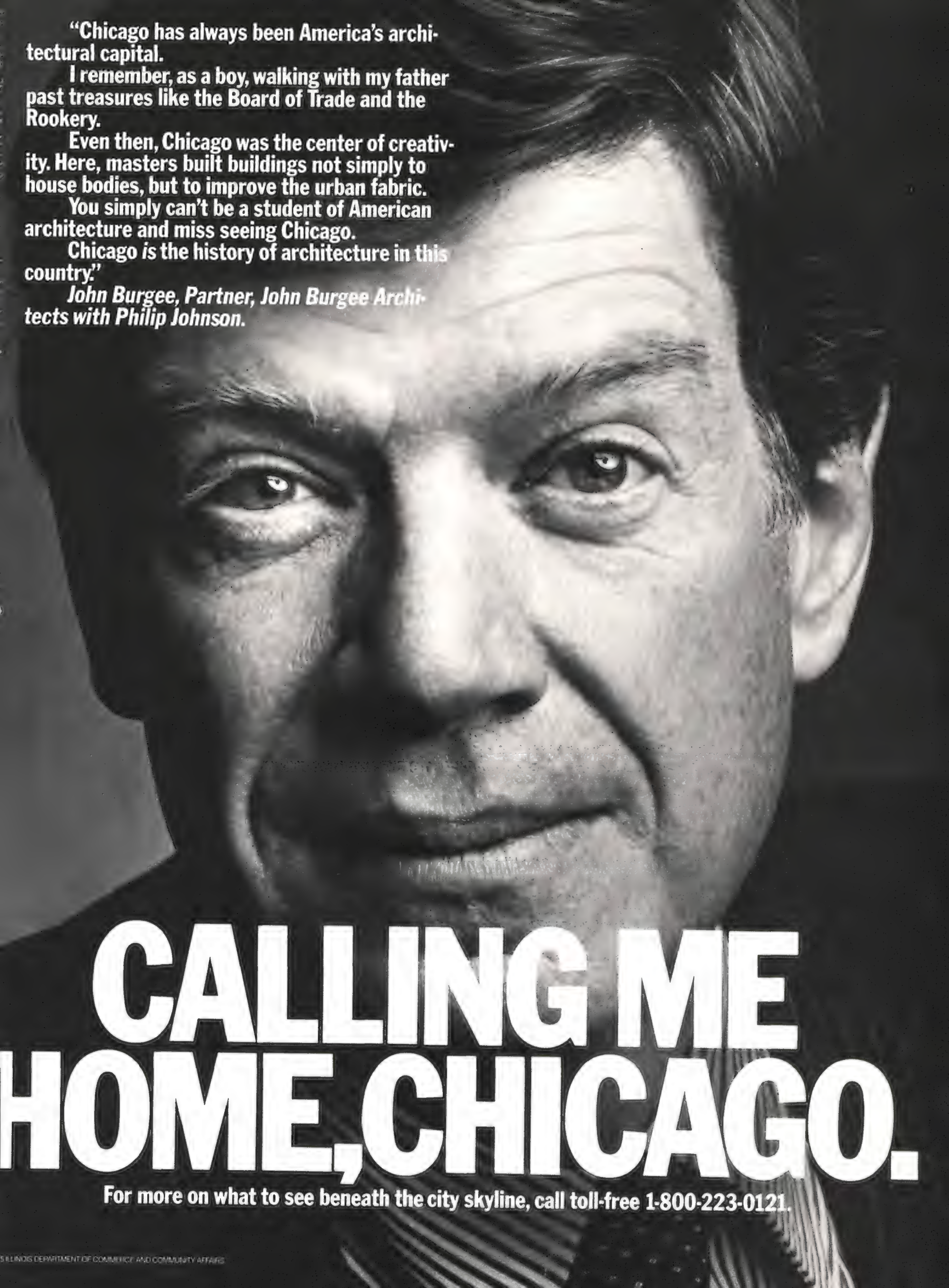
when it's opened, it yields up shelves, drawers and a surface for mixing drinks.



Dinette of Colorcore and plywood by Rory McCarthy has neoclassic accents.

Mitch Ryerson's reinterpretation of Victorian hall piece uses woven laminate.

Art Deco chest by John Cederqu
drawers aren't where you expe



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Vermont Sampler July 12-20: Peaceful beauty sets the stage for a look at Yankee history, culture and crafts.

Waterton-Glacier International Peace Park July 16-27 or August 13-24: Hike through spectacular alpine scenery with naturalists. Spend nights in remote, picturesque lodges.

Oregon July 19-28: Fresh sea air, colorful wild flowers, mountain vistas and historic lodges highlight this outdoor adventure.

Journey on the Green River July 19-29: Experience the thrill of white water and the beauty of Utah's magnificent Desolation and Gray Canyons.

Natural History in the Colorado Rockies July 28-August 3: Hike the majestic Pikes Peak area to examine local flora and fauna.

Middle Fork August 5-13: An unforgettable river trip on Idaho's Salmon River.

Colorado Mining and Railroads August 9-17: Relive the days when steam locomotion opened the West and the gold rush brought Telluride, Durango and Ouray to life.

Crow Canyon Archaeology August 11-18: Get hands-on experience as you join archaeologists near Mesa Verde, Colorado, to participate in a dig at an ancient Indian site.

Delta Queen September 6-14: STEAMBOAT A-COMIN! Board the legendary paddle-wheeler for a nostalgic voyage on the mighty Mississippi to Hannibal, Missouri, for the grand celebration of Mark Twain's 150th birthday.

New England Seaports September 12-22: Relive the great seafaring era. Visit the ports of Boston, Nantucket, Newport.

Arches/Canyonlands September 21-28: Utah's magnificent red-rock country, land of deserts, canyons and rivers. Travel by trail, jeep and raft with guide.

Maine September 21-30: Hike amid gorgeous fall foliage on rocky coast, inland mountains with a naturalist.

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Danube Cruise May 25-June 11: Cruise historic route from Bucharest to Vienna via chartered ship.

Europe's Northern Waterways June 30-July 13: Aboard *Argonaut*, cruise scenic rivers, tranquil canals and historic sea-lanes from England to Denmark.

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New Offerings This Fall
From October 27 through November 1, Smithsonian scholars will lead five exciting new seminars. In addition to a week of intensive study, participants will enjoy specialized field trips, a gala welcoming buffet, evening performances, an elegant farewell dinner; hotel is optional. *Fall 1985 seminars include:*

Anthropology Today
The National Museum of Natural History presents lectures, field trips and talks with experts in physical and cultural anthropology, archaeology and linguistics.

Perspectives on American Art
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By Raymond E. Lovett

Hello, Old Paint. Thanks for the ride

Congratulations, Fella! You have just made it past the 100,000 mark. That's a lot of miles, kid. And believe me I'm grateful. "She's got a few miles on her," people say derisively—mainly men talking about women, I'm afraid. I once overheard that said about *me*, and it hurt! But for a nine-year-old family station wagon, these days, 100,000 miles is a triumph.

Oh, I know I seem to have taken you for granted since we set out together back in 1975. And like too many parents (and husbands) I've done my complimenting behind your back—told *others* what a great wagon you are, and have always been. But you've kept rising in my estimation, from "only car" to "best car ever" to "good Old Paint"—and even "good Old Greeny."

It is true that once, in a moment of frustration and disloyalty, I resolved to say goodbye before you dropped dead on the highway, planning to sell you off for peanuts to some mechanically-minded, sweaty-palmed youth. But since then I've had no thought of selling you, or trading you in. I think I've been secretly waiting to share this six-figure moment together. I even have a sort of Grecian Formula plan for de-rusting your aging panels, putting in a shiny new seat and stereo that will be the envy of every teenager on the block, plus a classy paint job to add luster to your distinctive blue-green hue.

Of course, I'll admit I've abused you in thought, word and deed. Remember when I got so mad I bent your steering wheel? Or the time I slammed the front door so hard the window glass shattered? But didn't somebody once say, "Car ownership is never having to say you're sorry"? What's a family wagon for anyway? Besides, all that ire was really meant for the boss, the wife and the kids, or for life in general. You just happened to be there.

It's been a long trip together, though. One hundred thousand miles roughly translates into a year of eight-hour days at the wheel. You carried on in happy times, triumphantly bringing our second son back from the hospital. As a kids' basketball coach, I piled a winning team of nine-year-olds in the back and took off for home, singing. In fact, you're the only one who's ever heard me sing my entire repertoire, from "Red River Valley" to "Stardust" and "Deep Purple," without complaint. Thank God you can't talk. The cussing you've heard!

I've rented racks for your top, to lash on boats and bicycles that gored your once shiny roof with their pedals. I've hitched a permanent, unsightly ball to your back bumper for hauling motorcycle trailers and tons of sand-filled summer junk. The kids used to throw up in the backseat a lot. And when you reached middle age I put those extra-heavy springs under you so I could play Paul Bunyan with my chain saw and firewood. It's true, too, that mostly I've been as stingy as Jack Benny where you're concerned. I can't believe how few times I've washed you; I'm ashamed of the ages that passed between oil changes. Tires were another story, though. You've had the very best, kid—costly radials replaced at the slightest sign of baldness.

And let's face it, you weren't perfect either. I came to accept your weak areas: water pumps (you needed four); alternators (three did it, though one was a cheap, rebuilt job); solenoid ignitions (three in nine years!). But then you had to learn to live patiently with the fact that I'm totally nonmechanical. How many times have I opened your great, green, greasy hood and peered inside, vainly hoping that by some automotive miracle I'd hit on what was wrong—only to be greeted by the same silent, noncommunicative you. Trying to look knowledgeable, I'd check the dipstick, eyeball your world-weary radiator, touch your lugs, shake the cables. You refused to be cured by these amateurish ministrations, or to divulge your secret.

Everybody else in the family longs for a flashy new set of wheels. My son is ashamed of you. Remember just last week, when he asked to be dropped off three blocks from school? He was embarrassed! If you want to know, it was that moment which confirmed me in my decision to give you a classy face-lift.

I also wanted, well, some meaningful moment to mark our 100,000 miles together. Attention must be paid, as somebody said in another connection. Cars can't use candles or cake, and your customary jeroboam of Quaker State wouldn't seem festive enough. And then, as if some benign fate had stepped in, on the day you turned 99,999 to 100,000, we both got on television and, in a modest way I suppose, into history.

The town fathers of our quiet suburb had put up a new STOP sign, where none had ever been before. Most drivers just plain ignored it. But a few kept stealing the signs as fast as they were put up. Exasperated, but still in good humor, the fathers installed a new sign, with a different and longer message. It read: AT LEAST SLOW DOWN, FORMERLY STOP. This tickled local, and then national, TV people, and cameramen were down there filming the very day you passed the 100,000 mark. As we cruised through the intersection of Kenilworth and Argyle, the cameras were rolling. That night, watching the evening news, I felt an almost parental pride, and more as I imagined the whole country watching my wagon during its finest six-figure hour. Hello, Old Paint. And *muchos años*!

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